Chemical Age

Tube Investments Contributions to Fundamental Research (page 445)

VOL. 82 No. 2099

3 October 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

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Valethene containers combine the high chemical resistance and inert properties of polyethylene with the strength, robustness and handling characteristics of universally accepted standard steel drums. Bulk transit of corrosive and sensitive liquids can now be made more conveniently, safely and economically.

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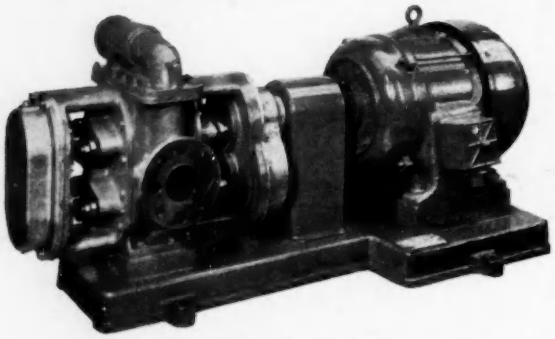

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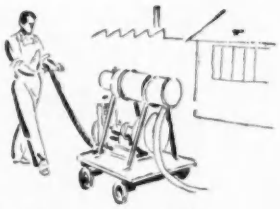

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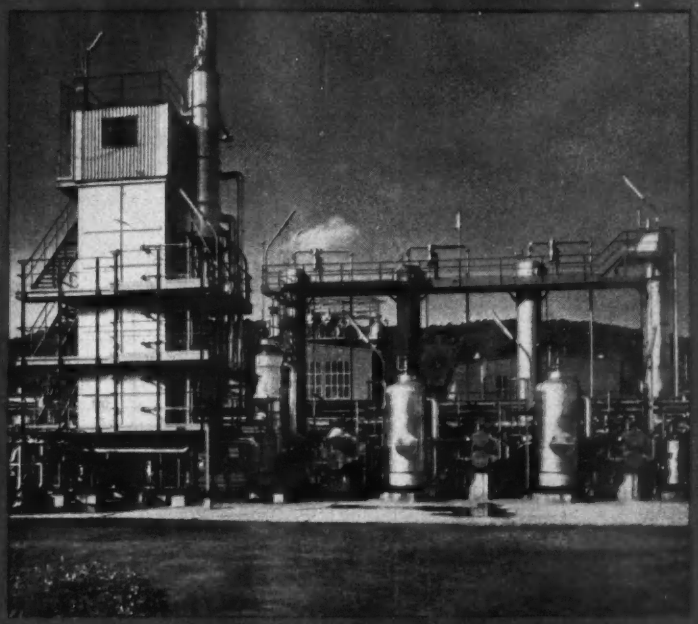

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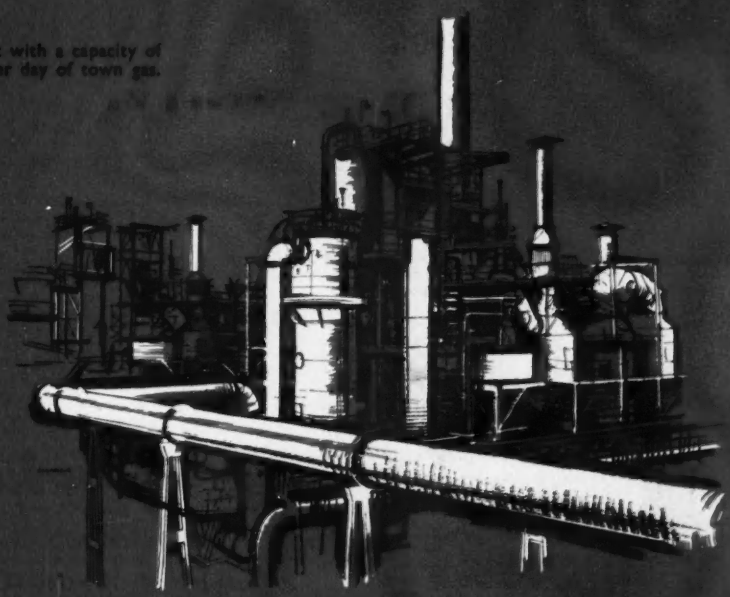

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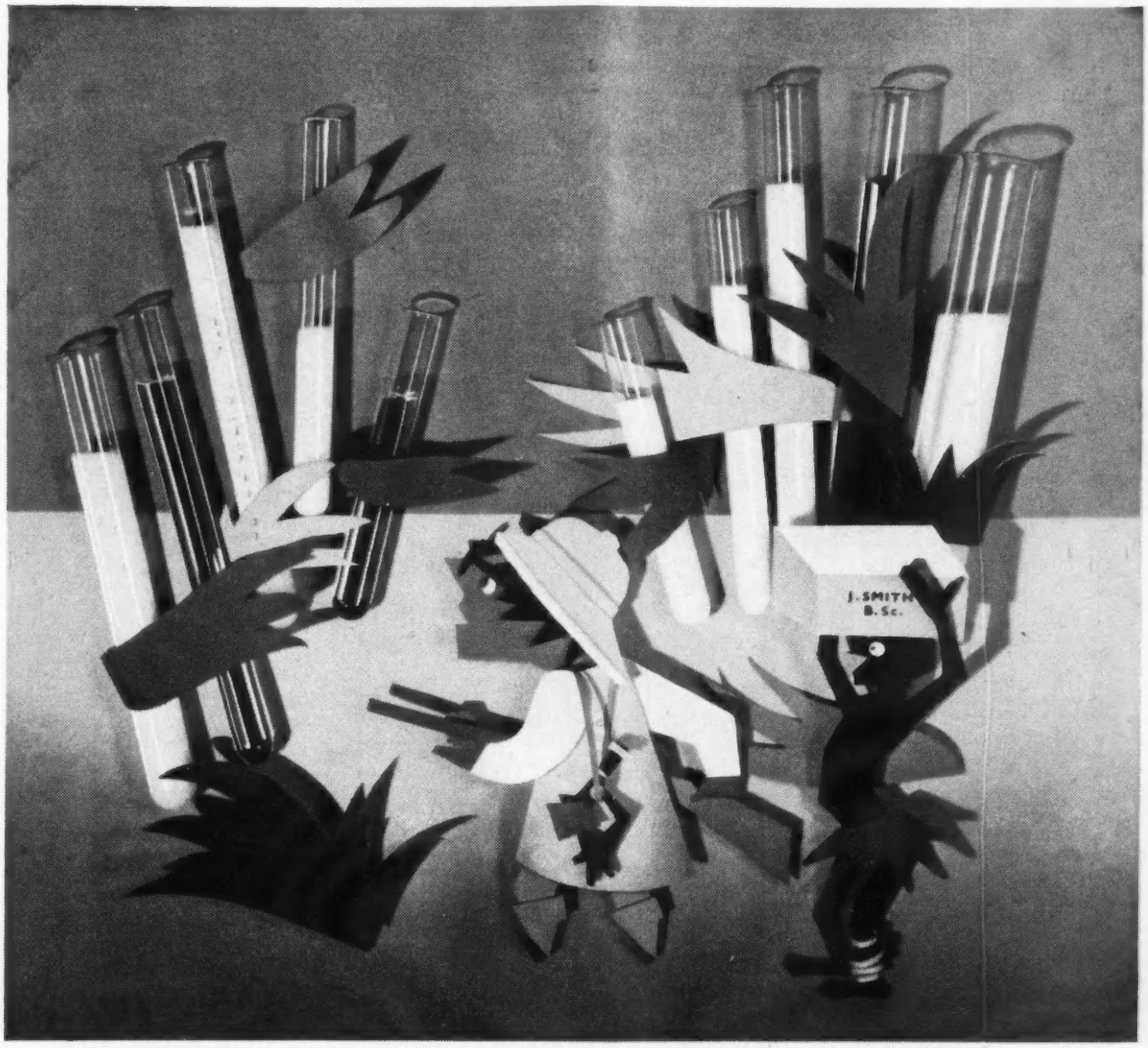

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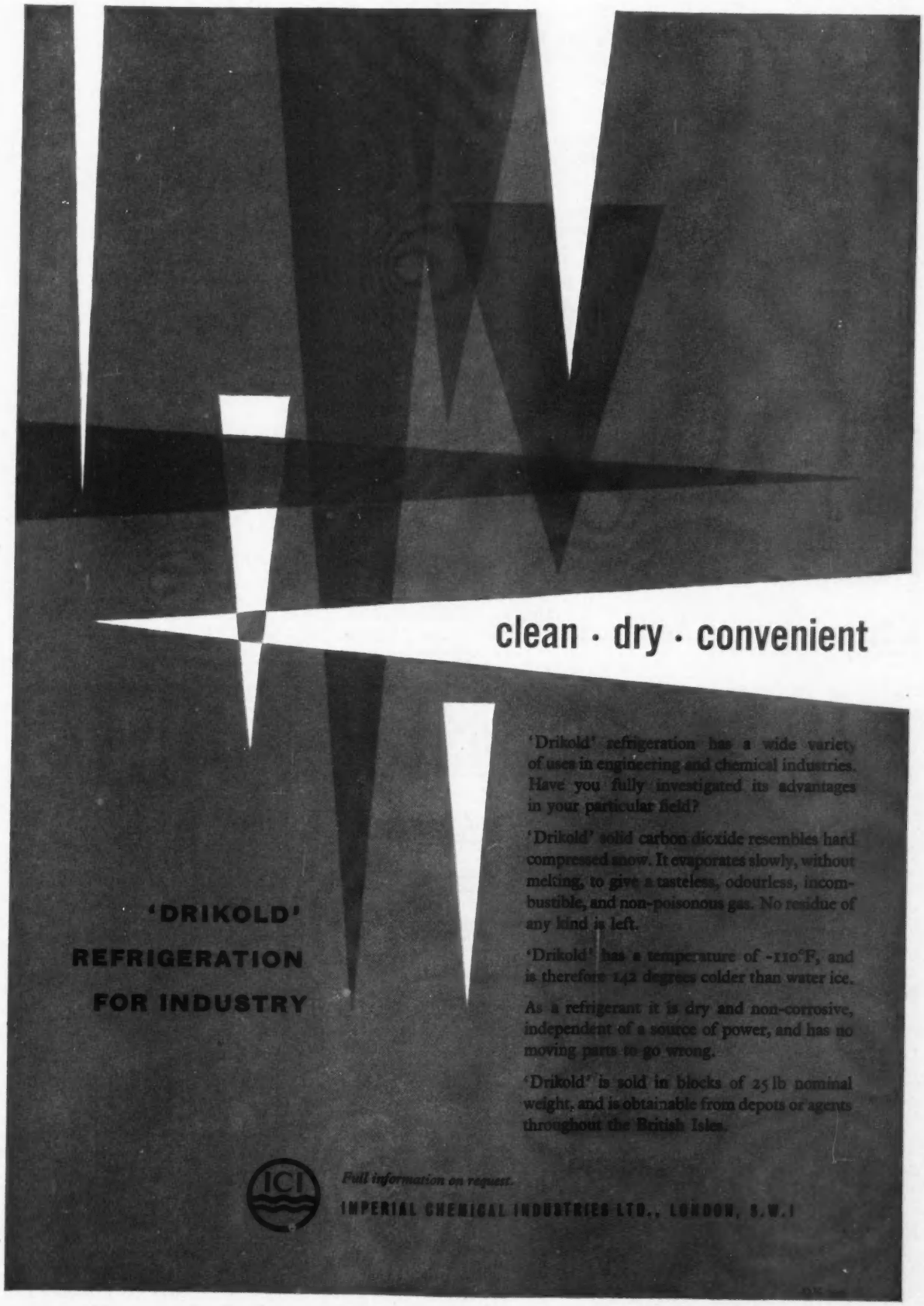
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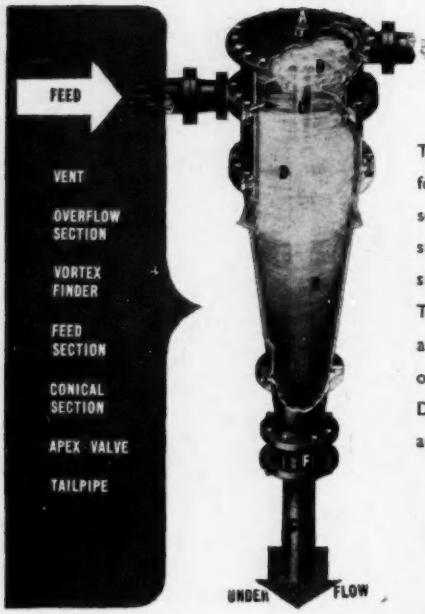

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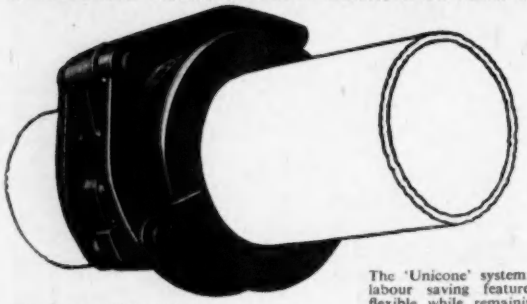

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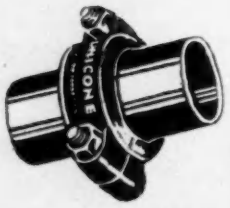

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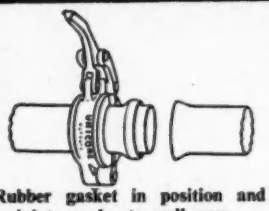
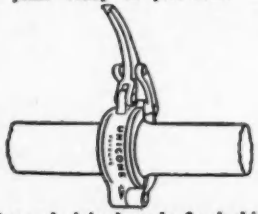
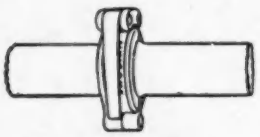


Rubber gasket in position and joint ready to pull over.



Pipe ends joined ready for locking.



The completed joint.

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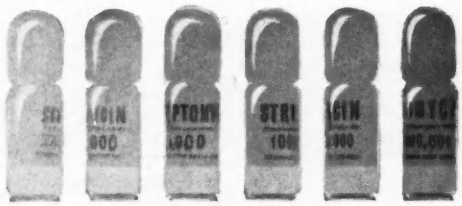
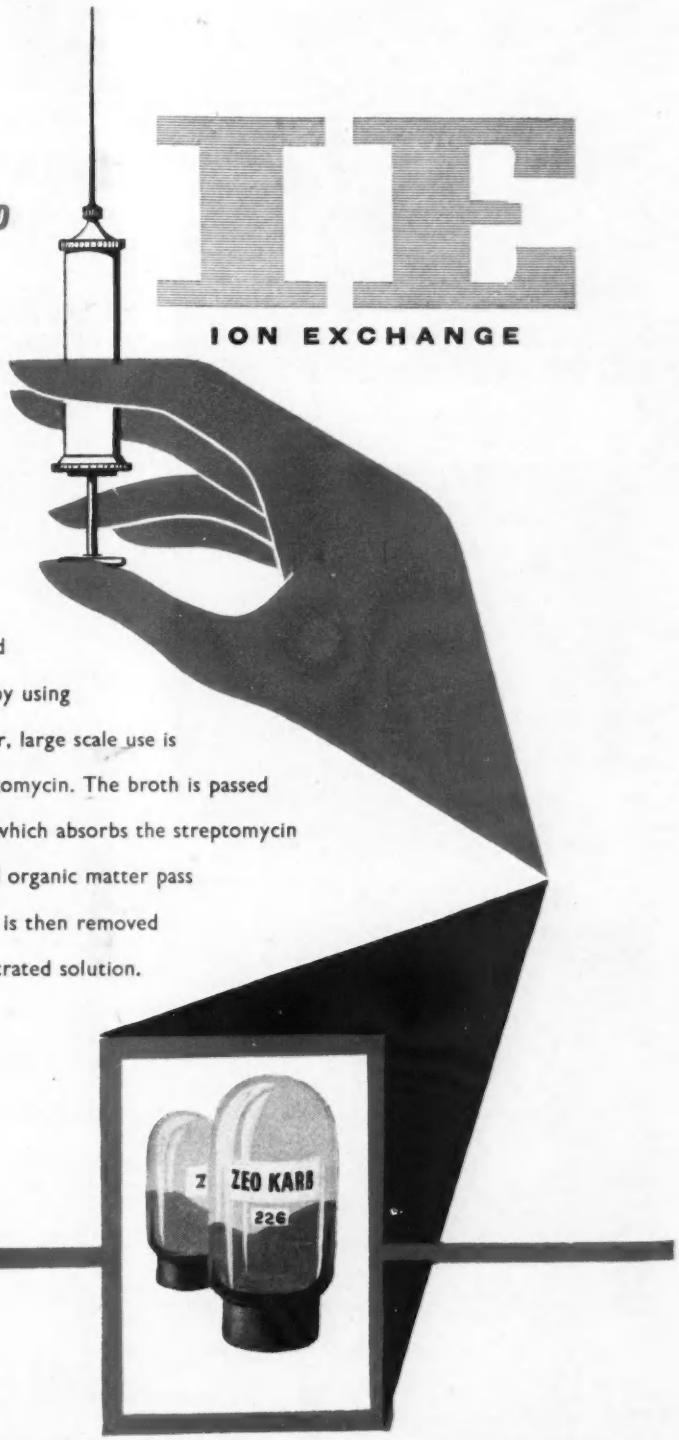
ANTIBIOTICS AND IE

ION EXCHANGE





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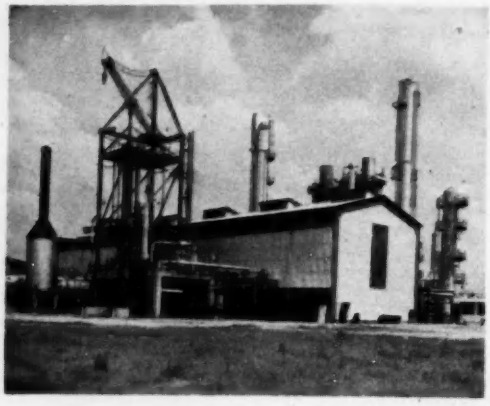
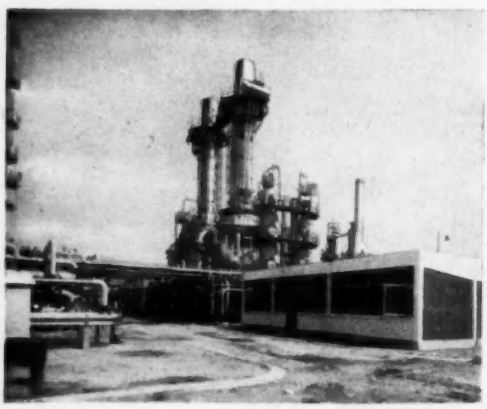


The Kellogg developed quench type synthesis converter with removable catalyst basket is located under permanent crane.

Interior of control house.



Control house with reforming furnaces in the background

AMMONIA PLANT

FOR

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BY

KELLOGG

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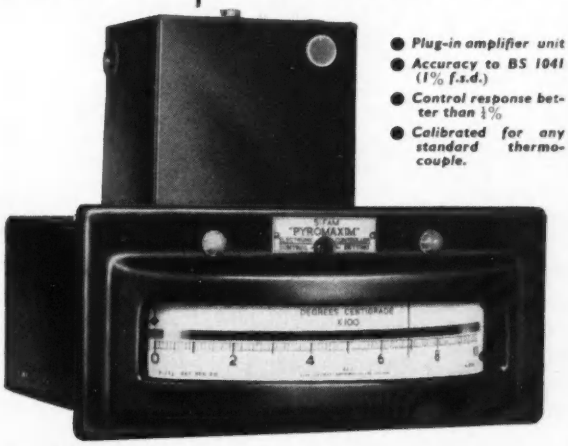

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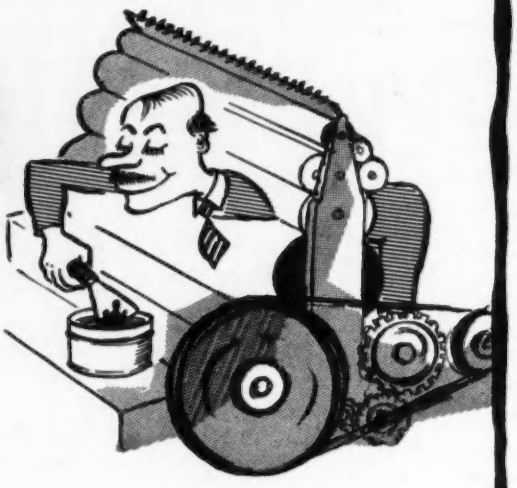

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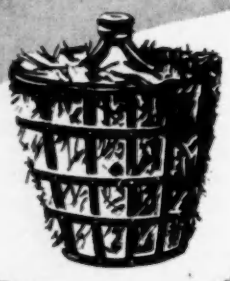

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

CHEMICAL INDUSTRY TRENDS

WITH the beginning of the fourth quarter of the year, those responsible for marketing in the chemical industry are considering the coming year and likely trends. Last week in CHEMICAL AGE the U.K. chemical industry's plant facilities were noted. At the end of the same week, Imperial Chemical Industries' half yearly results and progress report were announced. On a straight comparison with the corresponding period of 1958 results, I.C.I.'s group sales to external customers have risen by nearly 8% to £250 million. Group net income, however, has gone up by 52% to £18.97 million, a rise that owes little to the tax cushion. The results, in fact, reflect the effect of an appreciable increase in the volume of sales and a reduction in selling prices over a wide range of I.C.I. products. The increased volume is due mainly to the higher level of industrial activity in the U.K. and to a substantial increase in exports, and the increased profit is attributable to "lower unit costs of production arising from fuller utilisation of manufacturing capacity" and improvements in technical efficiency.

What are the trends for 1960 and the next 10 years? As was indicated last week, little appears to be planned in new plant facilities after 1960. In the U.S., however, J. Peter Grace, president of W. R. Grace and Co. (*U.S.J. Commerce*, 14 September) expects a record expansion of new chemical plants in 1960-62 as a result of cutbacks in spending during the past 18 months. In the period 1957-58 new construction in the U.S. amounted to $3.84 billion.

A noticeable trend since the war years has been the number of oil companies that have entered the chemical industry. Shell Group have formed Shell Chemicals Ltd. well known now for their agricultural chemicals and insecticides and more recently, through Petrochemicals Ltd., for plastics raw materials; and Esso are going ahead with the marketing of a number of chemical speciality products. Also when the demand for synthetic rubber created a need for butadiene, it was the petroleum refiners who were responsible for much of the basic development in this field. The oil companies can be expected to increase their activities in the chemical field during the 1960's.

The oil companies are not going to have everything their way, however, for recently the larger chemical companies have entered the petrochemical field. I.C.I. have, in the last 10 years built up the largest petrochemical complex outside the U.S. at Wilton, and 10 years hence, their Severnside project which will be based on petroleum feedstocks, will be under way. Distillers Co. Ltd. with their interests in British Hydrocarbon Chemicals, Grange Chemicals and Forth Chemicals, now have considerable facilities in this field; Monsanto Chemicals have ethylene and butadiene supply arrangements with Esso and Courtaulds through British Celanese are expanding their petrochemicals production.

Marketing men in the U.S. are expecting the chemical industry to attract a growing number of newcomers from other industries. Notable U.S. examples are Quaker Chemical Co., a subsidiary of Quaker Oats, who entered the field because of their utilisation of by-products from oat husks for industrial alcohols; and Armour because of their upgrading of fats and oils into soaps and detergents. In this country, probably the most interesting examples are: Glaxo who from their milk products for babies have entered

the pharmaceutical chemistry field with antibiotics, hormones, vitamins and recently through Murphy Chemicals, the agricultural and pesticides field; Oxo Ltd., with a strong interest in steroid hormones; and Bengers Ltd., the milk food company, with specialised pharmaceuticals such as dextran and intravenous iron preparations.

It is suggested that the next few years will see the creation of more joint ventures. Behind this lies the need for companies to share know-how and business assets in order to overcome competition. Other examples of joint ventures are companies with technological experience but lack of money to set up plant or lack of marketing knowledge once the product is available. In particular, this trend for jointly formed companies is noticeable in Europe and the U.S. But it is also now apparent that it is not only U.S. companies who seek to join with established U.K., French, German or Italian chemical concerns. There is traffic in the other direction so that we have I.C.I. joining Celanese Corporation of America to make polyester (Terylene) fibre through Fiber Industries, Badische Anilin- and Soda-Fabrik, of Germany joining Dow to set up Dow Badische and Bayer with Monsanto who have formed Mobay Inc.

In a recent symposium on 'Chemical Marketing in the Competitive Sixties' in the U.S. (*Chem. and Engng. News*, 1959, **37**, No. 37, 106), it was stated that more U.S. producers are investing abroad so that they can fight foreign competitors on their home grounds. An increasing number are also exporting technology in place of products. Returns, it is claimed, either in royalties or in equities in overseas operations, often equal or exceed profits lost to competition in export markets. U.K. chemical companies should also consider exporting know-how more widely to the U.S.

Much has been heard of U.S. companies setting up British subsidiaries with plant facilities, but not a great deal in recent years about U.K. companies setting up plant in the U.S. or South America. Italy's Montecatini and France's Saint Gobain, however, have plans for setting up chemical plant in the U.S.

Research in the chemical field can be expected to become very much more competitive, for in the 1960's a producer must be able to do more than put out new products. Grace warns that too many companies are now working on polymers, fibres and drugs. Obviously more selectivity will be required and also more testing and application study. Newness will not suffice; and patents will become more important. Fulfilment of an actual need is more likely to bring success than seeking out a need so that strong market development techniques will be needed. The U.S. industry is well aware of this but in the U.K. very little has been heard about market research.

Most annual reports from U.K. chemical companies, both large and small, have laid stress on prices. The usual practice is to price products in relation to manufacturing costs, to have high prices during the early stages of marketing until the volume of sales is such that prices can be reduced. In future, it is expected that prices will be related to competitive materials, with new chemicals being sold at volume prices from the beginning, even at the cost of subsidisation; this should assist development of volume usage at a faster rate.

During the last few years, there has been a decided stress on recovery of by-products. Too often in the past, it has been either too difficult or too costly to recover by-products from waste materials. Now with more attention being paid to wastes, because of economic factors or pollution control, chemical producers are finding that their research is paying off. The most notable recent example in this country is British Titan Products' production of sulphuric acid and ferric oxide from their waste by-product ferrous sulphate.

Growth in the U.K. chemical industry in the 1960's can be ensured by investment in plant, in research, in economic studies, planning and selling. Closely linked with these factors will be chemical market research. There is no doubt that it will come to the fore in the next few years, that it will be found profitable by chemical industry in guiding technical activities, in assessing competition, in aiding marketing and in finding new markets for established products. Now in its infancy in the U.K. chemical market research will need care in its development and organisations and chemical companies' own created divisions will require to be soundly based.

U.S. RESEARCH EXPENDITURE

PRELIMINARY figures have just been issued by the National Science Foundation which show that U.S. industry spent $7.2 billion on research and development in 1957. This figure is 19% higher than the 1956 total of $6,000 million and 110% higher than the 1953 total of $3,400 million. Of the 1957 figure of $7,200 million, the U.S. Government provided $3,700 million.

Basic research, the N.S.F. survey shows, then took $241 million or 3% of industry's total research and development expenditure. Also, two industries—aircraft and parts and electrical equipment—spent more than half of all research funds. These two industries are, of course, closely united to the U.S. missile and space programme.

Private industry put up almost half of its own research and development money. In industrial chemistry the U.S. Government provided 9% ($33 million) of the money spent on research. In drugs and medicinals and other chemicals, 1% ($1 million) came from the Government. Petroleum refining and extraction drew 4% ($9 million) from the Government. Among the industries that depend least on federal funds are: drugs and medicines; other chemicals; glass products, industrial chemicals etc. These, in fact, supply more than 90% of their own research and development money.

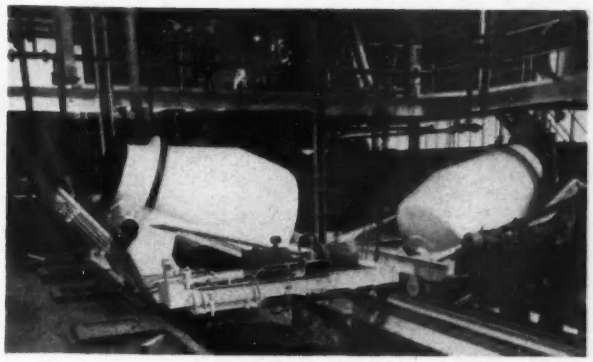
Of the $241 million spent on basic research, it is found that the chemical industry spent 12%. But it is pointed out that the industry was not necessarily the most basic-research minded; just that they might have had more money available. The two industries who devoted the largest percentage (over 10%) of their research and development funds to basic research were drugs and medicines and petroleum refining and extraction. In the industrial and other chemicals fields, 3% of the total research money went for basic research.

The N.S.F. survey indicates, however, that the $7.2 billion spent by industry on research and development, in 1957 was only 75% of the total spent in all sections of the U.S. economy. Industry, aside from colleges and universities, non-profit making institutions and the Federal Government all spent money on their own research and development programmes which is estimated at about $28,000 million thus making the grand total for the U.S. $10,000 million.

What of present U.S. research and development expenditure? An American management association survey of 600 U.S. companies shows that research budgets are 12% higher this year than in 1958, a record year, which in turn was 4% higher than 1957. Budgets have been raised by 64% for development of new products and processes, and 28% have reduced their outlays.

U.S. chemical industry has boosted research and development budgets by an average of 11.3%. Generally, the budgets for 1959 will average 3.2% of 1958 sales, compared with the 2.8% of 1957 sales. The chemical industry's budget will average 4.3% of 1958 sales.

MUREX'S NEW Ta/Ni PLANT WILL HAVE FLEXIBILITY OF OUTPUT



Metal leaching section during installation period

WITH the ultimate aim of concentrating under one roof all their facilities for the extraction of tantalum and niobium and their production as salts, metals or oxides, Murex Ltd. have designed and set up a new tantalum/niobium plant at Rainham, Essex. Capital outlay required will total about £400,000, and as announced by Murex chairman, Sir Arthur Smout, in the company's annual report, the plant has been substantially completed and certain sections are already in operation (CHEMICAL AGE, 5 September, p. 261).

The active production line of this new plant extends from the stage of raw materials handling to the drying of pure crystals of potassium tantalum fluoride. The reduction, leaching and drying facilities for the preparation of tantalum metal powder will come into operation this week, thus rendering unnecessary the continued employment of equipment now scattered in other parts of the works.

Crude potassium niobium oxyfluoride is also emerging in quantity at the present time, but this material is being purified and converted to metal in the old premises of the department. By the spring of 1960 an entirely new process line will have been installed in the new building to make possible the large-scale production of niobium oxide and metal of high quality.

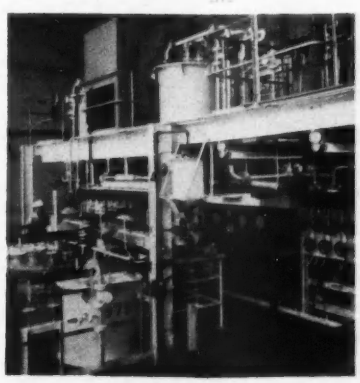
Handling Reagents

Raw materials fed to the plant are attacked by strong concentrations of hydrochloric acid, nitric and hydrofluoric acids. Handling of these reagents, singly or in combination—sometimes at elevated temperatures—gives rise to many problems of selection of materials of construction. No universally suitable lining has been found for tanks, liquor pipelines or fume ducting and among the substances employed may be listed rubber, Vulcoferran, polythene (standard and type Q40) rigid p.v.c., Fluon, Resilon, graphite and stainless steel.

Liquid/liquid extraction is employed for the separation of tantalum and niobium from each other and from the major impurities carried in the primary solutions. Equipment for this process is housed in a section which is isolated from the rest of the department by a fire wall which extends from floor to roof and the most important elements are mixer-settlers of novel design. These are constructed in polythene and their agitators are driven by air motors as a precaution against the fire hazard. Stringent regulations governing the procedures of maintenance staff have been devised to ensure that undue risks are not incurred during repair shut down periods and all items of plant can be easily removed from the section should they require re-welding. Design has been based on the principle that prevention is best, but liberal fire-fighting equipment has been provided as an additional safeguard.

The dangers to which operators might be exposed due to the employment of considerable quantities of strong acids and alkalis and to the use of metallic sodium in quantity have been dealt with in many different ways. Partitioning, ample provision of catch trays and elaborate fume ducting all play their parts in making the plant safe for working. To mitigate the effects of unforeseen accidents there is a generous supply of eye baths, showers and full length slipper baths in which immediate total immersion is possible. The buildings are supplied with conditioned air from a large plenum plant and the exhaust fumes from process vessels are passed through a wet scrubber which reduces the concentrations of noxious gases to well below the statutory limits. They are then discharged to atmosphere by way of a Resilon stack which is supported by a steel lattice tower and makes an interesting landmark.

As it is already apparent that tantalum and niobium, together with their oxides, carbides and salts, are destined to be in demand for a very wide range of purposes, some of which will call for special qualities of refinement or physical condition, a great deal of attention has been paid to the need for flexibility of output. It is recognised that requirements for the many possible end products will fluctuate irregularly. Provision is therefore made for varying, without dislocating the work of individual sections, the ratios of niobium and tantalum in process. Furthermore, different methods of reduction to metal will be employed according to the characteristics preferred by individual customers and simultaneous production of carbides, oxides and salts in frequently changing proportions will also be possible.



Part of liquid-liquid extraction section

Head Wrightson Overseas Plant Contracts

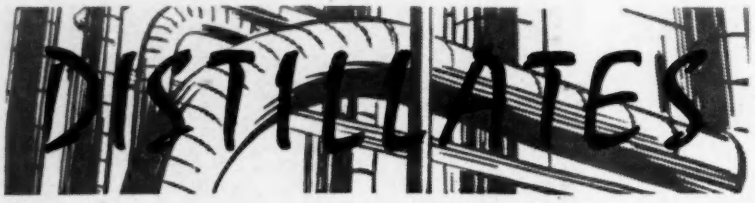
AN ADDITIONAL sintering plant is to be supplied by Head Wrightson Iron & Steel Works Engineering Ltd., to the Aviles works of Empresa Nacional Siderurgica S.A., the Spanish national steel company.

The new plant will form an extension to the existing sinter plant and is designed to produce an additional 10,000 tons of blast furnace sinter per week. The total value of the equipment to be supplied is approximately £500,000.

Recently received from the Denver Equipment Co. has been an order for three classifiers valued at £19,163 to be installed at a copper mine in Haiti. This equipment will be supplied by Head Wrightson Stockton Forge Ltd., a subsidiary of Head Wrightson and Co. Ltd., to handle 500 short tons per day of copper ore. The installation is part of a new development project at the mine to increase production and the classifiers will be of the 66 in. simplex double pitch submerged type with a tank length of over 35 ft. and a spiral speed of 3¼ r.p.m. The classifiers will overflow all minus 100 mesh copper ore.

Accidents Pinpointed in Ministry Journal

Representative accidents notified to H.M. Factory Inspectorate are described in Accidents, No. 40, the quarterly journal published by the Stationery Office for the Ministry of Labour. Among them was the scalding of a laboratory assistant when a flexible hose used for obtaining samples of boiler water snaked. After the accident permanent draw-off points were provided.



★ THE rise in the I.C.I. interim dividend was higher than generally expected: so was the £10 million increase in group income. Group sales are up by nearly £20 million and profit margins have also shown a healthy improvement. After the disappointing results of 1958, it is gratifying to learn that both sales volume and net profits are now more satisfactory in relation to capital employed.

With other large chemical companies reporting better results and with exports at a record level, the U.K. chemical industry is having its best-ever year. Plants generally are operating at their optimum capacities, and chemicals continue to be the pacemakers so far as industrial expansion is concerned.

I.C.I. chemicals go to every industry and their sales figures disclose the extent of the recovery in British industry.

★ THE difficulties of the Sicilian sulphur industry, about which I have written before, appear to have worsened and I am told that the mines now find it impossible to compete in the international market. A Sicilian statute of March 1959 sanctioned the creation of a 'rotation fund,' reorganisation of mines, relief for workers, and, particularly, the preparation of a general plan which is to be carried out in five years at the most.

Approved in May, the plan divides Sicilian mines into two categories: those that contain reserves large enough to carry on after the five-year period; and those whose reserves will be exhausted in five years or less.

The plan envisages improvements in mining methods and intensification of mechanisation, reorganisation of labour, improvements in qualifications of executives and technicians, and limitations in production of molten sulphur in favour of mineral taken as it is, or of concentrated types. Each operator has now to submit a plan for his own mine, prepared in such a way as to constitute a part of the general plan.

★ BENEFICIATION—a time-honoured method for separating minerals from less valuable components—could be equally useful in many industries far removed from the production of minerals. So says Mr. Adam L. Wesner, a specialist in beneficiation research at Battelle Memorial Institute, Columbus, Ohio. Writing in the September issue of the *Battelle Technical Review*, Wesner says that the techniques of beneficiation are being used more and more to solve a host of industrial problems.

He lists 28 unusual applications for beneficiation techniques that are in limited use or are feasible. These range from the separation of sewage from water by a flotation process to the separation of weeds from seed by electrostatic separation.

Wesner suggests that technical men in non-mineral industries should make a critical examination of their raw materials, intermediate products, final products and all waste products in the search for ways to employ beneficiation techniques to separate materials. "Skilled and capable personnel in industries outside the mineral field," he concludes, "often fail to take advantage of low cost beneficiation methods because the techniques which might be used are foreign to their experience."

★ SCIENTIFIC education is in the news as never before and we are all keen to see the country's talent used to the best advantage. Hopes may be raised too high, however, and a warning by Dr. David Traill, retiring research director, I.C.I. Nobel Division, may be timely.

The belief that the scientific population of the universities could be raised by 24% in three years assumed an untapped source of talent that he felt could not exist, Dr. Traill said when a presentation was made to mark his retirement.

Dr. Traill also delivered the following aphorism: research in the long term should be romantic and in the short term cynical and practical.

★ A SOUTH of England factory whose workers were critical of some aspects of safety rules and campaigns asked the National Institute of Industrial Psychology to conduct an 'attitude survey' among employees on safety questions. The institute sent investigators who asked the workers what they thought was good and bad and how what was wrong could be remedied.

The employees were sceptical about the company slogan that safety came before production, saying that if this were really true, there would be no incentive bonus schemes, which encouraged hasty and careless actions. They also disliked safety competitions in which days off through injury counted against the record of a department; this might constitute pressure to return to work before workers were fit.

As a result of the survey, the firm has made many improvements in its safety organisation and has introduced regular meetings of managements of associated departments, provided training in public speaking for managers, rationalised safety rules and brought them up to date in consultation with the workers, strengthened safety training, allowed for quicker removal of possible hazards and changed its approach to the question of encouraging safe practices.

Although the management concerned had previously paid close attention to safety questions, they readily admit that the survey has given them an insight into problems of which they were not fully aware.

★ BORON research projects during the next 12 months of the U.S. Bureau of Mines will be aimed at encouraging commercial production and increasing the usefulness of this important and versatile element. Metallurgists at the Albany Metallurgy Research Centre, Albany, Oregon, will continue to study methods of producing high-purity boron by reducing boron halides with an active metal, by fused-salt electrolysis and by electrolysis with organic baths.

Research on purification and processing of the experimental products will involve vacuum sintering, arc melting in inert atmospheres, electron bombardment and controlled crystal growth. The Bureau plans to publish several technical reports on its boron research projects.

★ FRANCE will join the U.S. and Mexico as one of the world's main sulphur producers in 1962 when the sulphur recovery plants in the Lacq natural gas fields come into full operation. It is estimated that output will then total 1.4 million tonnes a year, of which more than half would be exportable. France's annual sulphur production could later rise as high as 2 million tonnes.

I understand that the exportable surplus would be offered at normal world prices. A 'gentlemen's agreement' is said to be planned for the sulphur market of the future, with France supplying —at first, at any rate—only her Common Market neighbours with sulphur and leaving the rest of Europe to U.S. and Mexican producers.

★ CONTROL of plant growth is now believed to be no longer a remote possibility. Scientists of the US Department of Agriculture, Belleville, Ill., have isolated two pigment forms, one of which has been found to regulate plant growth. Each is a protein that functions as an enzyme but neither has been fully purified or identified chemically.

USDA report that the form predominating in a plant depends on the colour and intensity of light the plant absorbs. That which absorbs infra-red light regulates growth and that which absorbs red light does not. The scientists consider that in time they will be able to modify the pigments at will, thereby governing height, flowering, etc., in plants.

Alembic

RESEARCH AT TUBE INVESTMENTS LEADS TO NEW INSTRUMENTS AND TECHNIQUES

Great Potential for X-ray Scanning Microanalyser

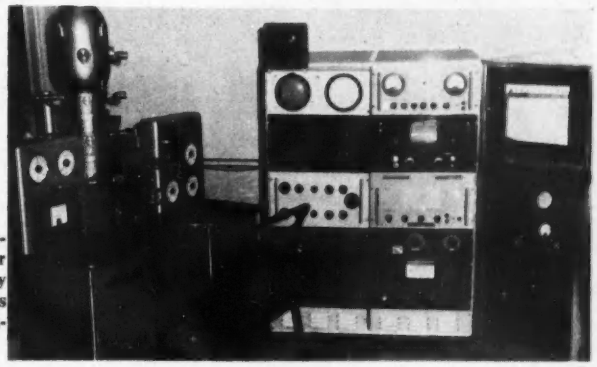
RESEARCH being undertaken by Tube Investments Ltd., at their new research laboratories, T.I. Research Laboratories, at Hinxton Hall, Audley End, Cambridge, was shown to the technical press on Monday. The company started research work at Hinxton in 1954, but further facilities were required so that during 1956-58 a new laboratory block was built and the laboratories were functioning by the beginning of this year. This has been designed mainly for work in the solid state physics field but provision has been made for specialist facilities in other fields. Plans for the new laboratories were bought from U.K. A.E.A. which are consequently very similar to those of the Harwell establishment.

The total staff at Hinxton is about 150, but T.I.'s total research and development staff exceeds 450. The new research laboratories are part of T.I.'s Research and Development Division, the four other establishments being: T.I. Technological Centre, Walsall; T.I. Department of Technical Information, Birmingham; T.I. Computer Unit, Walsall; and T.I. Operational Research Unit, Birmingham. T.I. first formed a research and development department in Birmingham in 1929. In 1950 the company found it necessary to increase their facilities for long term research. Chief executive of the division is Sir Ben Lockspeiser, scientific director of Tube Investments Ltd.

First of its Kind

X-ray Scanning Microanalyser. Demonstrated for the first time was an X-ray scanning microanalyser, the first of its type in this country and believed to be the first in the world. The first prototype instrument was developed at the Cavendish laboratory, Cambridge, by Dr. P. Duncumb, in collaboration with Dr. V. E. Cosslett. The technique was originated by R. Castaing of France. As it promised to be a powerful research tool for the metallurgist, T.I.'s Dr. D. A. Melford, with Dr. Duncumb have designed a microanalyser specifically for work on metallurgical problems. Commercial development of this instrument is being undertaken by Cambridge Instrument Co. Cost of the commercial product is likely to be about £16,000.

The technique consists of an electron beam focused to a diameter less than one micron scanning the surface (¼ mm. square) of the specimen under investigation in a similar manner to the beam in a television tube but rather more slowly.



The X-ray scanning microanalyser developed by Tube Investments Research Laboratories

X-rays are emitted by the surface atoms when irradiated by this beam. The X-ray emission is collected by a counter. Output from the counter modulates the brightness of a beam scanning an oscilloscope screen in synchronism with the electron beam scanning the specimen. By means of a crystal spectrometer (lithium fluoride was the analysing crystal in use for iron) it is possible to select one particular X-ray line and collect in the counter the emission at this wavelength only. An image is thus formed in which the brightness at any point is proportional to the amount of the emitting element present in the corresponding point to the surface of the specimen. Scanning can then be stopped and the probe positioned (by reference to the displayed image) on any interesting feature. Quantitative analysis is then carried out by recording the intensity of the emission on a pen recorder, and comparing the intensity of the emission from a specimen of the pure element when irradiated at the same beam current. Alternatively, average analyses can be obtained over any desired region by appropriately limited scanning.

Under present operating conditions, electron diffusion in the specimen limits the resolution to about 1 micron, so that the maximum useful magnification of the X-ray image on the oscilloscope screen is approximately ×1,000. There are also facilities, however, for collecting the high energy scattered electrons by means of a scintillation counter and again displaying an image on the oscilloscope screen. In this respect the instrument functions as a scanning reflection electron microscope, and it is thus possible to examine the surface topography at considerably higher resolution.

Radioactive tracer investigative studies on tubes

Facilities have been provided for optical observation of the specimen inside the instrument in order to assist location of the field of interest. This can be automatically re-located and the reflection image at the same or greater magnification examined.

Slight modifications are necessary to make the instrument suitable for analysis of all elements heavier than chlorine ($Z=17$) and possibly silicon ($Z=14$) Major changes in the recording system are needed to extend the range to carbon and nitrogen. This work is shortly to be put in hand by T.I.

While purely a research tool, this X-ray scanning microanalyser could well have wider application in the metallurgical industry.

Non-metallic 'whisker' crystals. When metals are made into very thin needle crystals ('whiskers') actual strength is greatly increased at the expense of ductility and may approach the theoretical strength. Brittle solids, such as glass and ceramics, are not ductile, even when they are crystalline, as the dislocations are immobile. Thus cracks can run through them easily and quickly so that they have a limited use and are generally regarded as weaker than metals. Extremely thin 'whiskers' or 'fibres' of these brittle materials are often free from cracks, and may show the highest mechanical strengths so far recorded for any solids (e.g. about 1,000 tons/sq. m. tensile strength for 'whiskers' aluminium o[illegible] and silicone carbide).

Very strong 'whiskers' have been made at Hinxton from a number of refractory materials, such as aluminium nitride and oxide, and silicon carbide and nitride, which in bulk are very weak. The practical objective behind this research is an attempt to use the very strong 'whisk-

ers' to make engineering materials with improved resistance to heat and to mechanical and thermal shocks. 'Whiskers' were shown of aluminium nitride, aspirin, sodium chloride, aluminium oxide (m.p. 2,050°C), antimony trioxide (m.p. 656°C), silicon nitride (m.p. 1,900°C) and silicon carbide (m.p. 2,600°C).

This section of T.I. Research has also developed a unique micro-tensile testing machine to measure the strength of whiskers. It can apply loads in increments of 1 mg. (1/30,000 oz.) to whiskers having cross-sectional areas down to 0.2 sq. microns (1/3,000,000,000 in.) and can detect specimen extensions of less than 10 Ångstrom units (4/200,000,000 in.).

Beryllium and impurities. The influence of impurities on metal deformations is being investigated by Dr. J. Sawkill. The metals being studied are beryllium and steel.

The future of beryllium is very much in the balance at present. It could have a great future as a light alloy, and it is being considered as a canning material for high temperature gas-cooled reactors and, because of its high specific strength and stiffness, might be used for missile and aircraft components. Tube fabrication and other metal forming operations have proved difficult, however, because of its lack of ductility. A basic study of the influence of impurities on beryllium ductility is therefore being carried out. Commercially pure metal is being examined with the aid of the metallurgical microscope in a search for impurity effects. Dr. Sawkill believes that, for the first time, a precipitation phenomenon has been revealed. This is the deposition within the metal crystals, of an impurity which was soluble at the higher temperatures used in producing the metal, but which, on cooling, is precipitated within the solid metal. To improve purity, zone melting is being employed, and also to try to obtain single crystals, which can be further purified. It is suggested that the effects with beryllium may be a question of degree of behaviour. Its similarity with zinc in regard to fracture has been noted.

U.K.A.E.A. Sponsored

Part of this research has been sponsored by the U.K. Atomic Energy Authority. Support is being given to the T.I. Technicological Centre at Walsall, which with the Chesterfield Tube Co., a T.I. subsidiary, has developed techniques for making tubes of this intractable material.

Modern tube making methods demand a regular supply of high quality steel and although there is much empirical information about effects on metal workability of residual elements which are finding their way into steel (copper, tin, nickel, etc.), little is known about the exact way in which they behave. These 'tramp' elements segregate at the steel surfaces during preferential oxidation which occurs in steel reheating operations. This process is being studied with the X-ray scanning microanalyser.

High Energy Irradiation Studies. Research on radiation-induced chemical reactions has been undertaken by T.I. Research under the leadership of W. H. T. Davison and Dr. S. H. Pinner, to determine the scope of this technique in chemical synthesis and fabrication processes. This section has a van de Graaff accelerator and irradiated cable and other shaped objects were exhibited.

Attention has been given to means of economising on the radiation doses necessary for cross-linking of polymers. This has involved research on filters and polymerisable plasticisers.

Irradiated materials at T.I. Research include a range of cross-linked polythene products and graft and attenuated network copolymers based on polythene, polyvinyl chloride and cellulose acetate. These polymers, Dr. Pinner indicated, had been found to have improved solvent and chemical resistance and high temperature mechanical properties.

Some pilot production is being carried out by T.I. on irradiated polythene film for B.I.P. Plastics and they are working in conjunction with Peterlite Ltd. on a modified methyl methacrylate product. Cure has been effected efficiently and economically by irradiation. On behalf of Smith and Nephew Ltd., T.I. have applied irradiation for sterilisation purposes to such products as bandages, dressings, 'Elastoplast', etc.

Preparing polymer material for irradiation

Corrosion Studies. Stress corrosion and corrosion and passivity are being investigated by Dr. C. Edeleanu. The way in which stress corrosion crack penetrates the metal has been studied. It has been found that mechanical stress and chemical attack can operate in partnership in bringing this about. The crack penetrates in steps, the crystal structure and the state of strain in the alloy playing an important part.

Because it depends as much on environment as on the material, there is no absolute scale of corrosion resistance. As the relative performances of alloys is different in each environment, an understanding of the basic electro-chemistry of the corrosion reactions is being sought particularly for stainless steels. Knowledge of the conditions under which the protective oxide films are stable should help to predict which of these two factors have to be considered in any given case.

Influence of oxidising power of acid solutions, etc., on the behaviour of material can be studied using the potentiostat. With this instrument it is possible to assess the influence on corrosion. The instrument can also be used to assess effect of environment on variables on the performance of any given alloy.

Lubrication and Wear. Basic physical and chemical principles involved in lubrication during metal drawing are being investigated by Dr. G. W. Rowe. Radiotracer techniques have been used to determine the often minute amount of lubricant (a few millionths of an inch thick) passing through with the drawn material. Lubricant can be trapped by forming suitable pockets on the surface, for example by grit-blasting, so that even with chemically inactive lubricants, reductions in cross sectional area are limited in the research equipment to be shown, not by lubricant breakdown, but by the ultimate tensile strength of the drawn material.

Wear of tungsten carbide is being studied by radio-tracer techniques. Tungsten carbide is normally bonded with cobalt for use in dies. Both the tungsten carbide and the cobalt can be made radioactive, and the radioactivity of the separate components decay at widely differing rates, which makes possible a detailed study of the wear process. It has been found that the wear of tungsten carbide is steady, the transfer amounting to about 10^{-10} g./cm. of sliding, which can be accurately followed by the radio-tracer technique; the wear is not erratic as had previously been supposed.

The influence of a number of variables on wear for dry and lubricated sliding on steel, copper and other metals, has been determined. When the slider passes from a dry region to a lubricated one, the wear rate may adjust to its new value in a few milliseconds. Small mechanical defects in the copper or steel cause sharp local increases in wear and patches of rust may increase the wear a hundredfold. Practically all good lubricants cause some chemical attack so that the wear in presence of a lubricant may sometimes exceed that on the dry metal.

The reverse process of transfer of copper or steel to the tungsten carbide, usually known as pickup, is being studied with radio-tracers. Microgram quantities of copper transfer steadily to the carbide surface and then back again, carrying small percentages of the carbide with them as sliding proceeds.

Projected Plant To Use Scottish Coal

HUBBARD & Setterington, London, in conjunction with Mitchell Engineering Ltd., are inspecting areas adjoining Douglas Castle pit in Lanarkshire to find a site for a low-temperature carbonisation plant. The first phase of the operation, which would cost £100,000, would be a pilot plant to test the process.

This would be followed by a £500,000 plant if the calculations made were confirmed. The plant would use cannel and other coals mined in Lanarkshire to make oil, gas, sulphate of ammonia and smokeless fuel at prices which, it is believed, would enable coal products to match the cost of oil and gas from other sources. It is also thought the process might be applied to peat.

NEW PRODUCTION DEVELOPMENT DEPARTMENT FOR PFIZER

Will Devise Economic and Easier Methods of Manufacture

ON their factory site by the sea at Sandwich, Kent, Pfizer Ltd. have added a new production development department, including a pilot plant, at a cost of £100,000.

The Sandwich factory is bounded on three sides by the River Stour, which gives an ample supply of water. This was one of the major considerations when the company decided some years ago to extend from Folkestone and build on a marshy site which needed piles up to 120 feet long to make it suitable for building.

The new buildings mark the completion of an important stage in the development of the factory, but they have been constructed so as to make it easy to extend them if necessary.

Dr. P. G. Jones heads the production development department, which is a link between the research departments and the basic chemical and fermentation production departments. The function of the department is to devise economic and convenient methods of manufacturing chemical and fermentation products which have been discovered and tested in the research departments.

Four Sections

The department is organised into four sections:

The chemical laboratory is concerned with small-scale development of organic synthetic processes and is the immediate link between the department and the chemical research department. Various reactions for preparing a particular compound are studied in detail, with the object of devising the most economic and convenient method of manufacturing a product. Once a preferred sequence has been selected the process is transferred to the organic synthesis pilot plant.

Organic Synthesis Pilot Plant. In this section a study is made of the many factors involved in carrying out an organic chemical process on a large scale and ultimately the process is modified so that it becomes suitable for full-scale manufacture. The department is often called on to make intermediate quantities of materials which are too big for laboratory preparation and too small to be made in the pilot plant.

The preparations area has been designed so that these commitments can be fulfilled. This section is very flexible and can be used for carrying out the majority of chemical reactions on an intermediate scale. Many of the products prepared in this area are used for initial field and clinical trials and as raw materials for further investigational work.

Fermentation Development Laboratory. Here fermentation processes are developed in a similar way to chemical processes.

Biochemical Pilot Plant. In this section larger-scale investigations take place on the recovery of valuable materials from experimental fermentation broths.

The preparations area has very few permanent fixtures and has been designed so that small glass plants can be constructed and dismantled with the minimum inconvenience. Many services are provided, giving maximum flexibility.

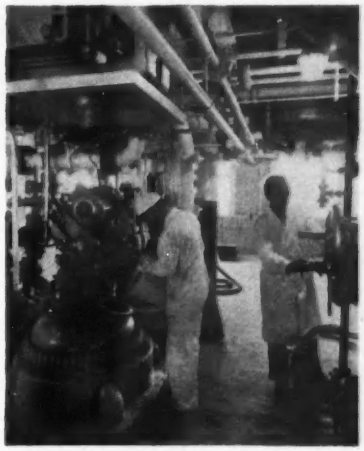
The pilot plant is constructed on three levels, the ground floor and first floor containing mainly organic synthesis equipment. A number of general-purpose vessels are provided of both stainless steel and glass-lined construction with capacities in the range 20 gall. to 100 gall. The vessels are capable of operation under a wide variety of conditions, thus giving much flexibility to the plant. Most of the vessels are heated and cooled by a common heat-transfer fluid which enables jacket temperatures in the range of −15° to 275°C to be obtained. The top floor of the pilot plant contains the biochemical section, with stainless steel equipment able to deal with volumes up to 500 gall.

A void in the centre of the plant not only houses the service lines, but provides a convenient space to erect fractionating columns, ion exchange columns, etc.

The fermentation development laboratories are equipped with 5-litre stainless steel fermenters and ancillary equipment.

Mr. E. J. Tridgell, a biochemist, is responsible for the fermentation development section, Dr. C. A. Bartram, an organic chemist, for the chemical development laboratory section, Mr. A. G. Smith, an organic chemist, for the organic synthesis pilot plant and preparations area, and Mr. R. M. Foster, a chemical engineer, for the biochemical pilot plant and general engineering and process matters within the department.

Part of the organic synthesis pilot plant at Sandwich



Loading a centrifuge in the Pfizer production development department

Fuels for Gas Industry

OPTIMISM with regard to the future of the gas industry was expressed by Sir Harold Smith, chairman of the Gas Council, this week. This optimism is based on the gas industry no longer being dependent on coal. Since nationalisation of the industry, the price of coal had risen out of all proportion for gas users with the result that during the last few years it had had a very hard struggle. The Gas Council had therefore done a lot of research on finding ways of making gas which did not require coal. Coal would form the basis of the industry for the next few years, but it would not be the same sort of coal that had been used in the past.

Ten years hence, the industry would have a national gas grid or be well on the way to it. Into it would go gas from carbonisation plants, gas from oil at high pressures, gas from low pressure oil gasification plants, surplus gas from coke ovens, methane direct from coal mines and natural gas imported from abroad in liquid form. Price reduction would be considerable.

Import of liquid methane was not yet economic, Sir Harold stated. He pointed out, however, that when the council had a ship carrying 20,000 tons of liquid methane—the *Methane Pioneer* operating at the moment carries 2,000 tons—that would be the equivalent of gas from two million tons of coal a year. At present the industry is using some 24 million tons of coal a year.

Tonnage Oxygen Plant For Appleby-Frodingham

Appleby-Frodingham Steel Co. are installing a tonnage oxygen plant at their Scunthorpe works at an estimated cost of £750,000. Site work has already begun and the plant is expected to be in commission by the late summer of 1960.

U.K.A.E.A. Building First-Ever Pilot-Scale Radiation Processing Plant

RESEARCH work by the U.K. Atomic Energy Authority on the commercial-scale use of intense radiation for industrial purposes has now reached the stage at which a pilot plant is being built for operation by the end of this year. The plant is expected to be the first of its kind and size in the world.

The new plant is being built at the Wantage Radiation Laboratories for the technological irradiation group of the Isotope Research Division, Atomic Energy Research Establishment. Work on the useful employment of the large quantities of radioactive material which will become available as a result of the nuclear power programme has been in progress for some years, and this new plant will enable industrial firms already investigating the technical merit and commercial potentialities of irradiated materials to carry out full-scale trial runs of irradiation processes, such as the sterilisation of medical equipment and the disinfestation of packaged products.

The entire plant occupies an area of approximately 10,000 sq. ft. and is based on a unit package size of approximately 1 cu. ft. Packages will be handled continuously and automatically from bulk store through the equipment and into the treated material store. To ensure full utilisation of the captial investment, particularly of the source, which is continually radiating and decaying, the plant will operate 24 hours per day.

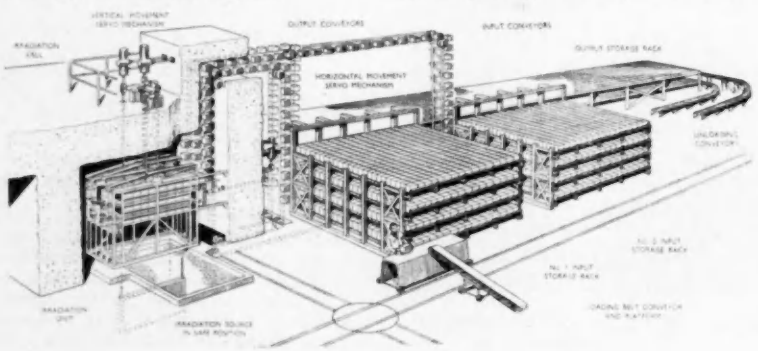
Preventing Health Hazards

Carefully designed inter-locks and control devices are being incorporated to prevent any health hazard and to ensure the correct radiation dosage.

The cell has been designed to house half a million curies of Cobalt 60, but will be loaded initially with 150,000 curies, which will provide a throughput of 7 megarad-tons per day. As an example, in 24 hours 3 tons of medical products or imported animal fibres could be rendered sterile, since a sterilising dose is about 2½ rads.

The contract for the detailed design and construction of the mechanical handling and storage equipment of the pilot plant at Wantage has been let to the Owen Organisation. The main companies within that group who are concerned are the parent company, Rubery Owen and Co. Ltd., Darlaston, and Electro-Hydraulics Ltd., Warrington. Other companies within the group will also contribute.

The design and manufacturing team built up by the Owen Organisation is working in close collaboration with the Engineering Division at Harwell who have established the general design and specification to the requirements of the technological irradiation group.



I.C.I. Introduce New Pigments and Resins

NEW productions introduced by the Dyestuffs Division of I.C.I. include Monastral fast blue RFS, a phthalocyanine pigment said to be resistant to the flocculation troubles that are common with phthalocyanine blue pigments in various media and troublesome in respect of shade change or 'development' in brushing or dipping applications.

In fastness properties, and notably in stability of shade in the presence of active organic solvents, Monastral fast blue RFS is similar to Monastral fast blue LBXS, introduced some time ago, but is somewhat greener in shade and tinctorially weaker.

Monastral fast blue RFS is of particular interest for use in air-drying alkyd media, stoving enamels or nitrocellulose lacquers and printing inks. Sales Circular SC 837 gives full details.

Bedacryl 3X, another new product of I.C.I. Dyestuffs Division, is a vinylated drying-oil alkyd resin, in solution in xylene, designed for use as the sole medium for white and coloured enamels that exhibit good gloss and build and very good durability and retention of colour and gloss, even on prolonged exterior exposure. The gloss characteristics of finishes based on Bedacryl 3X are said to be very good despite the exceptionally rapid rate of dry and solvent release of the finishes, which under normal conditions reach the touch-dry stage in about 15 minutes and become completely tack-free in about two hours.

Their very good build and gloss make Bedacryl 3X finishes attractive for one-coat industrial applications. Stoving enamels based on Bedacryl 3X show more rapid hardening, better water resistance, superior colour and better colour retention on prolonged stoving, as compared with finishes based on conventional short-medium oil alkyds.

Surface Coatings Pamphlet No. 1 (reference 6993) gives full technical data.

The outstanding feature of gloss finishes based on the new I.C.I. product, Bedacryl 5X, is their exceptionally rapid rate of dry, the dust-free stage being reached in about 10 minutes by ordinary air drying after dipping or spray application. Such finishes can be employed with advantage on wood in place of nitrocellulose lacquers in many cases, notably on kitchen furniture and gadgets, where their superiority in water and steam resistance is marked. They are also much less inflammable than nitrocellulose lacquers.

The other principal outlet for Bedacryl 5X is expected to be in the formulation of non-nitrocellulose sealing coats for wood, for overcoating with lacquers based on other film formers. (Surface Coatings Pamphlet No. 2 (ref. 6994)).

The Dyestuffs Division of I.C.I. extends its interest in the thixotropic paints field by the introduction of Modulac 147W, a drying-oil modified thixotropic alkyd resin in the form of a solution in white spirit, designed to serve as the sole medium in gloss paints of this type.

The notable characteristics of high-gloss paints based on Modulac 147W are, I.C.I. state, their gel structure in the undisturbed state, ensuring perfect pigment suspension on storage and good flocculation resistance; practical absence of any tendency to drip, splash or to accumulate in the stock of the brush during application; excellent build and flow; high resistance to after-yellowing and suitability for application as relatively thick films to obtain better one-coat application without risk of sagging. The paints become surface-dry in 5-6 hours and hard-dry overnight when compounded with the recommended driers. (Reference 6995).

Petrochemicals Polyolefin Plant

In the CHEMICAL AGE list of new chemical plants in the U.K., contractors were indicated for Petrochemicals Ltd.'s polyolefin plant which will produce polythene and polypropylene (p. 396). Contractors have *not* yet been appointed for this project. The information given under this heading regarding Lummus Co. and George Wimpey and Co. refers to Petrochemicals' ethylene oxide plant.

Overseas News

YUGOSLAVIA PLANS FIVE FERTILISER FACTORIES BASED ON LOCAL MATERIALS

THE yearly requirements of Yugoslavia in chemical fertilisers are estimated at about 1,300,000 tons; capacity of existing factories is expected to reach 750,000 tons in 1961.

As considerable quantities of raw materials exist in the country, the erection of five new plants is contemplated by the Government. The largest of them, at Pancevo, is at an advance stage of construction and it will produce about 360,000 tons of ammonium nitrate (20.5% of nitrogen) a year. It will utilise methane brought from the southern Banate by means of a 37-mile pipeline. Cost was put at $22 million.

The second plant, to be built at Lucavac, will produce 125,000 tons of ammonium nitrate. Construction has not been started, but contracts for equipment have already been placed. Building will be undertaken by Montecatini and Ansaldo of Italy and Rudnap of Yugoslavia. The plant will utilise the gas from a local coke plant.

The third ammonium nitrate plant, to be erected at Sisak, will produce up to 125,000 tons a year, utilising refinery gas.

A superphosphate plant will be erected at Prahovo and will use sulphuric acid produced at the Bor-Majdanpek Mines. Potential output has been scheduled at about 575,000 tons a year. Contracts for equipment have been placed. Another superphosphate plant, with a capacity of about 250,000 tons, will be built at Kossovska Mitrovica. It will utilise waste materials of the Trepka zinc mines. Negotiations are still in progress as regards contracts for equipment.

Hydrofiner Commissioned in Italy By B.P.

The sixth hydrofiner to come into operation for the BP Group has been commissioned at Porto Marghera refinery, near Venice, owned jointly by BP and A.G.I.P. The unit is capable of substantially removing the sulphur from 6,500 barrels of gas oil a day.

Associated with the hydrofiner, which is of BP process design, is a sulphuric acid manufacturing plant.

Other hydrofiners are operated by BP at Kwinana refinery, Western Australia, Hamburg refinery, Germany, Antwerp refinery, Belgium, and two at Kent refinery, England.

Detergent Sales in U.S.

Sales of synthetic detergents in the U.S. during the first six months of this year amounted to 1,540,602,000 lb., valued at $372,996,000, according to the Association of American Soap and Glycerine Producers Inc. This represents an increase of 7.9% in quantity and 6.9% in value compared with the first six months of 1958.

Soap sales totalled 523,084,000 lb. valued at $153,146,000—a 2.1% decrease in quantity but an increase of 4.3% by value compared with the corresponding period of 1958.

France May Supply Methane To Switzerland

Representatives of the Société Francaise du Methane et Gaz de France are reported to be negotiating with Swiss groups for the supply of about 1 million cubic metres of methane a day to Switzerland. One method of supply would be by a pipeline from Besançon to Basle. Chemical and other industries in Switzerland have formed a syndicate to consider the question.

Cuban Nickel Plant for Sale

Up for sale is the U.S. Government owned Nicargo nickel plant in Cuba. The General Services Administration will receive purchase proposals until 1 December. About $85 million has been invested by the U.S. in the plant which is located in Oriente Province of Cuba. The plant has a proven production capacity of 50 million lb. of nickel oxide powder and sinter a year.

Rumanian Fertiliser Plan to Use Natural Gas

A new combine for the chemical treatment of methane is to be built near Tirgu Mures, in Rumania, with a planned output of 500,000 tons of nitrate fertilisers a year. In addition, it will produce chemical products derived from acetylene for the plastics and synthetic yarn and fibre industries.

Sudan Pharmaceuticals Manufacture

Sudanese Chemical Industries are expected to go into production during October and will supply the local market with sulpha drugs, penicillin, aspirin, and various vitamin preparations. The value of output will total about £S500,000 during the first year, but production will eventually be increased to a value of £S4 m.

Israeli Government Sponsored Concerns Show Progress

Director-General of the Israel Ministry of Development, Menahem Bader, reporting on the progress of the industries—including Fertilizers and Chemicals Ltd., the Dead Sea Works, and Negev Phosphates Ltd.—stated that the Dead Sea Potash Co., which had a I£1 million deficit only two years ago, this year showed a surplus of I£2 million, and is expected to pay its first dividend within the next 12 months. The only plant still showing a loss with a I£100,000 deficit was the Dead Sea Bromine Plant. In view of the fact that orders on hand already accounted for its entire production during the coming year, it was also expected to improve its financial situation by then.

Mr. Bader also said that Government plans for the coming year included expansion of production at the Phosphate Works and other enterprises.

Sohio Acrylonitrile Plant Nearly Half Completed

Construction of the Sohio Chemical Co.'s new acrylonitrile plant at Lima, Ohio, is now nearly half completed and is on schedule, according to Badger Manufacturing Co., Cambridge, Mass., the engineering and construction contractors. Ground breaking for the plant that is "pioneering a new route to acrylonitrile" took place early in April. By 1 August all but a few pieces of major equipment had been put in place. First product test runs for the plant are now expected in early 1960.

This plant will employ a process unique in acrylonitrile manufacture—single-step direct conversion of refinery propylene and anhydrous ammonia.

Fertiliser Plant for El Salvador

A fertiliser plant is to be erected near the port of Acajutla, in El Salvador, at an estimated cost of Colones 38 m. (about £5½ million) the capital being supplied partly by the government and partly by the National Industries Development Institute.

Netherlands Chemical Imports and Exports

According to figures supplied by the Netherlands Central Bureau of Statistics in respect of imports into the Netherlands in the first half of this year, classified according to groups of commodities as specified by the Standard International Trade Classification, imports of chemical products totalled 440,300,000 guilders, as against 365,100,000 guilders for the corresponding period of 1958 a 20% increase.

In respect of exports, the figures were: 591,100,000 guilders in the first half of 1959, as compared to 524,500,000 guilders during the corresponding period of 1958 —a 13% increase.

U.S. Heavy Water Unit Turned Over to Army Chemical Corps

The U.S. Atomic Energy Commission has released its Dana heavy water plant, Newport, Indiana, to the Department of the Army for use by the Chemical Corps. The plant has been maintained in a standby condition since June 1957, following the Commission's determination that there was an adequate heavy water stockpile and foreseeable require-

ments could be supplied by the Commission's Savannah River heavy water plant.

The Dana plant is located near Newport, Indiana, on land owned by the Department of Defense. Construction of the plant was started in 1950 and it went into operation in May 1952. Cost of the plant was approximately $100 million.

Growth of S. Africa's Chemical Industry

Production of the South African chemical industry will increase to about £200 million in 1968, according to J. S. J. Kuschke, general manager, Industrial Development Corporation. This is about £70 million more than the 1956 total.

At a meeting held in Pretoria Mr. Kuschke said that the industry had grown from 204 chemical producers in 1938—with a total production of £12 million and about £5,600,000 invested in land and buildings—to 378 producers in 1956—with a total production worth £130 million and an investment of £85 million in land and buildings. Twenty years ago, the industry had about 13,000 employees. In 1955-56 there were 43,000. And by 1968 the figure is expected to reach 66,000.

Reichhold To Build $4 m. Maleic Anhydride Plant

Reichhold Chemicals Inc. are to construct a $4 million maleic anhydride plant at Elizabeth, N.J. Capacity of the new facility, which will be adjacent to R.C.I.'s plant at Elizabeth, will be 20 million lb. a year. The plant will go on stream in early June 1960. The project is one phase of the company's three-year $24 million expansion programme.

Maleic anhydride is used principally in the manufacture of synthetic resins, polyesters, paper sizes, plasticisers and related products, many of which are finding increasingly larger markets in industry today.

Licence for PVA Production in India

The Farbwerke Hoechst Indian subsidiary, Hoechst Fedco Pharma Put. Ltd., of Bombay, has been granted Indian Government permission to manufacture polyvinyl acetate emulsion at its Bombay plant at an annual capacity of 2,400 tonnes.

Swiss Firm to Enter Petro-Chemical Field

Lonza A.G., Swiss manufacturers of fertilisers and other chemicals, are to enter the field of petrochemicals, it was announced at the annual meeting. Raw materials may be obtained from the projected oil refinery at Aigle.

U.S. Styrene Capacity

U.S. styrene capacity next year will be an estimated 700,000 short tons, as against a national consumption of some 600,000 short tons. Producers of styrene in the U.S., with capacities in short tons, are at present Cosden, of Big Springs (7,100), Dow (Freeport productions 158,900; Midland production, 91,000 including vinyl toluol), Foster-Grand, of Baton Rouge (47,700), Koppers, of Kobuta (84,000), Monsanto, of Texas City (181,700), Odessa Styrene, of Odessa (18,200), Shell, of Torrance (63,600) and Union Carbide, of Institute (45,400).

Soviet Plans for Polish Petrochemical Plant

The Soviet Union has presented Poland with technical plans for the erection of a large-scale chemical plant in Plock, some 38 miles north of Warsaw. The plant, which will be connected to the planned pipeline network leading from the Soviet Union (at Kuibyshev) through Poland to East Germany and through Czechoslovakia to Hungary, is planned to be able to process 2,000,000 tonnes of mineral oil annually at the completion of its first stage in 1964 and 4,000,000 tonnes annually at its total completion in 1968. At present only 750,000 tonnes of mineral oil is processed in Poland a year. The Plock plant will combine the functions of refining and petrochemical plant.

Italians to Build Uruguay Plant

The Uruguayan Government has awarded an Italian company a contract to advise it in the planning of a plant for the manufacture of synthetic fertilisers. The projected plant would cost some 10,000,000 pesos.

Use of Acetone in the U.S.

Of the estimated total U.S. production of acetone in 1959 amounting to 690 million lb., chemical use will account for 54% of production, the greatest amount being taken for manufacture of methyl isobutyl ketone (180 million lb.). Production of bisphenol-A (epoxies, etc.), is expected to consume 12 million lb. of acetone, according to statistics published by the Oil, Paint and Drug Reporter.

Solvent use will account for about 46%. Paints, varnishes and lacquers will account for 65 million lb., cellulose acetate 75 million lb. and vinyl resins 35 million lb.

Firestone to Make Nylon and Polypropylene

Synthetic fibres are being added to Firestone Tire and Rubber's list of products with production of their own nylon filament yarn for making tyre cord. The company will make the yarn at a Hopwell, Va., manufacturing site recently purchased from Celanese Corporation of America.

Construction and modernisation of the plant is to begin within the next 60 days, Firestone say. They hope to have the plant ready for nylon production in the late summer of 1960.

Firestone Plastics Co. at Pottsdown, Pa., are to become the plastics and synthetics fibres division of Firestone Tire and Rubber and will take over the Hopwell plant.

The new plant will be devoted exclusively to synthetic fibres and resins. With nylon as its initial product, the plant will also include the first stage of a manufacturing unit for the production of polypropylene. Plans for polypropylene have not been revealed by Firestone as yet. The process for this plastics material was developed as an outgrowth of their research on polyisoprene (Coral) rubber, they report.

Nitro-Glycerine Plant for Peru

Explosivos S.A. have built a nitroglycerine plant in desert country 25 miles south of Lima, Peru. It has a capacity of 500 litres an hour and will supply about 75% of the country's needs.

U.S. Coal Chemicals—27% Production Fall

COAL chemicals and coke production dropped approximately 27% in the U.S. in 1958, compared with 1957 and was the lowest in 18 years according to the U.S. Bureau of Mines. Oven-coke plants operated at reduced rates of production throughout the year, averaging only 64% of capacity compared with 92% in 1957.

Use of coke for manufacturing producer gas and water gas has continued to decline, falling 15% from 1957 it is reported, and the total was only about one-fifth as much as was used for the same purpose in 1947-49. One of the main reasons why the use of coke for making water gas dropped was because Olin-Mathieson Chemical Corp. discontinued using coke as a starting raw material in making synthetic ammonia when they shut down their Morgantown, W.Va. ovens in June 1958. This plant was one of the two plants active at the beginning of 1958 that used coke as generator fuel for making water gas for ammonia synthesis.

Slower coking cycles in 1958 resulted in slightly higher yields of the basic coal-chemical materials. The large reduction in coal charged into coke ovens, however, caused output of the respective coal-chemical materials to decrease accordingly. Crude tar production dropped 23%; ammonia 27%; and crude light oil and coke-oven gas 28% each. Lower production of those raw materials made less available for processing, and ammonia sulphate decreased 30%; benzene 34%; toluene 26%; xylene 22%;; crude chemical oil (tar acid oil) 16% and coal-tar pitch 11%.

Probably the most significant development concerning coal chemicals was the substantial reduction in prices of the light-oil derivatives, particularly benzene. Competition from the petroleum industry and low-priced imported benzene forced the coke industry to reduce its price by 5 cents/gall. in July 1958. Coke-oven operators also reduced their prices on toluene and xylene.

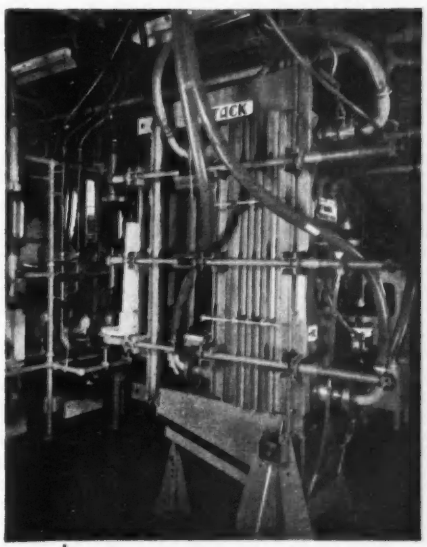
Total value of all coke-oven products used or sold by the producing companies totalled $1,300 million, a decrease of 28% from the 1957 figure.

DESALTING BRACKISH WATER

The first Electrodialysis plant for the reduction of the salt content of brackish water to be supplied from Europe on a commercial basis has been installed and is now operating

at TOBRUK

This plant, designed and installed by William Boby & Co. Ltd. for The Libyan Public Development & Stabilisation Agency reduces the salt content of the water from 5,000 ppm to a potable level of 500 ppm. It has been operating so successfully that our client has now ordered additional 'Boby' plant to increase the daily output to 100,000 gallons —sufficient drinking water for the entire population of Tobruk.



The original plant undergoing trials at the laboratories of William Boby & Co. Ltd.

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Chemist's Bookshelf

PROGRESS IN CHROMATOGRAPHY

CHROMATOGRAPHIC REVIEWS. Volume 1. Edited by *Michael Lederer*, Elsevier Publishing Co., 1959. Pp. xi + 276. 45s.

The *Journal of Chromatography* was first published in 1958 and in the course of the year there were six parts printed at two-monthly intervals. Several reviews were commissioned and published and nine of these form the basis of the book under discussion. The references to the originals are as follows.

Demole, 1958, **1**, 24; Michl, *ibid*, 93; Reio, *ibid*, 338; Marini-Bettolo and Casinovi, *ibid*, 411; Neher, *ibid*, 122, 205; Sestak, *ibid*, 293; Harborne, *ibid*, 473; Chemla, *ibid*, 2; Hettler, *ibid*, 389.

Of these nine reviews, four of the originals were in English, three of the remainder in German and the other two in French. Translations of the German and French reviews have been made by Miss A. G. M. Macdonald and P. Oesper and the whole now published in English under one cover as volume one of a series. This series relates to progress in chromatography, electrophoresis and related methods and it is proposed in the next volume to deal with such topics as gas-liquid chromatography, gas-adsorption chromatography, starch gel electrophoresis, techniques of measuring radioactivity on paper chromatograms, the separation of DNP-amino acids and inorganic adsorption chromatography.

In the volume under review Michl contributes an interesting general review on high voltage electrophoresis which promises to be useful in shortening times of separation and increasing the sharpness of individual chromatographic separations. Demole draws attention to the interesting work which can be carried out by methods involving the use of chromatostrips and chromatoplates. In this form of chromatography one side of a glass strip is coated with a paste consisting of an adsorbent, water and a binding agent such as starch. The dried and hardened absorbent layer is used as a medium on which to carry out chromatographic separations. Although primarily concerned with the paper chromatographic separation and identification of phenol derivatives produced by the action of *Penicillia* moulds on suitable media Reio's paper is of very wide interest and well worthy of study by all analysts who deal with phenolic compounds.

On the inorganic side Chemla deals with the separation of isotopes by chromatography and electrophoresis while Hettler deals, in the main, with the paper chromatography of condensed phosphates. On the specialised organic side there are four reviews which deal respectively with anthocyanin pigments, the paper chromatography of chloroplast pigments, the separation of strychnos and curare alkaloids and a very comprehensive review of the chromatography of sterols and steroids.

The individual reviews are well written and the references to the original literature are very comprehensive. For example, the review on sterols and steroids includes no fewer than 393 references to original papers. There is no doubt that these reviews will be very useful indeed, but the writer has the feeling that it is rather doubtful whether the voluminous literature on this subject should be increased by the immediate collection in English of reviews which have appeared so recently in the literature.

J. HASLAM.

Satisfactory Blend of Theory and Practice

CHROMATOGRAPHISCE METHODEN IN DER ANALYTISCHEN UND PRAPARATIVEN ANORGANISCHEN CHEMIE. By *Ewald Blasius*. Ferdinand Enke Verlag, Stuttgart. 1958. 139 Figs. and 40 tables. Pp. xx + 370. DM.99 (full linen).

Primarily, this book has been written to bring the German-speaking reader up to date in the development of chromatography for, as the author points out, the majority of papers on the subject have appeared in Anglo-American journals. In undertaking the writing of such a book, he has set himself an enormous task because, in his definition of chromatographic methods, ion-exchange, partition and adsorption chromatography, and electrophoresis are all included. Further, he has endeavoured to give a satisfactory blend of theory and practice. The text contains 10 chapters. In the first chapter, the basis of chromatographic procedures and the historical development of the subject are discussed. This is followed by a fundamental section in which the author discusses the physical-chemical treatment of the processes involved in chromatography. In the first part of the chapter, the treatment of equilibria in a closed system, such as occurs with ion-exchange resins, is undertaken. All the recognised approaches, including adsorption isotherms, the Nernst distribution law, the law of mass action and the Donnan Theory, are covered. In the second part the theory of chromatographic processes in open system is outlined. These are followed by chapters on the structure and properties of adsorbents, the influence of solvent and adsorbent in complex-formation, the apparatus of column-chromatography, the uses of ion-exchangers, other adsorbents used in column-chromatography, partition chromatography and its uses, ionophoresis and electrochromatography, and ion-exchange membranes.

Literature references, some as recent as 1957, are provided at the end of each chapter. Particularly valuable are the tables of separations achieved by paper chromatography and ionophoresis. These give the elements separated, the solvent, the developing reagent, the type of paper used and the literature reference. On at least one occasion they have proved of value to the reviewer.

This is clearly a well-written, well-planned book. The author has set out to give his reader the most up-to-date detailed information on the subject of chromatography. He has succeeded. Indeed, sometimes the detail is almost overwhelming. Perhaps the weakest point of the book is the title. A translation is "Chromatographic methods in analytical and preparative inorganic chemistry," which leads to the impression that the discussion of the analytical and preparative sections are of comparable proportions. This, as might be expected, is not the case. The preparative section amounts to two pages, covering acids, bases, salts and colloidal solutions. This volume is, however, very worthy of recommendation.

R. J. MAGEE.

Organic Sulphur Chemistry

ASPECTS OF THE ORGANIC CHEMISTRY OF SULPHUR. By *F. Challenger*. Butterworths Scientific Publications, London. 1959. Pp. vii + 253. 40s.

Study of the fascinating problems provided by the organic chemistry of sulphur has not only given much intellectual pleasure to organic chemists, but has also illuminated the widespread biochemical and industrial significance of sulphur compounds. But the number of books and reviews on this subject is very small.

The book consists of six well-documented essays, the first of which is devoted to the properties, detection and biological significance of mercaptans, monosulphides and disulphides. Here, as in some other parts of the book, Professor Challenger does not attempt to provide a systematic survey, but confines himself to selected features of special interest. The second chapter deals mainly with natural sulphonium compounds, sulphoxides and thiophen derivatives. Sulphur compounds occurring in petroleum and other mineral oils are discussed in the third chapter, which also includes a useful account of Raney nickel desulphurisation. The next two chapters survey biological methylation and the mustard oil glucosides, and the final chapter tells the story of co-enzyme A.

These six essays contain much valuable material and the reader cannot fail to catch Professor Challenger's enthusiasm for this intriguing branch of chemistry. Unfortunately, a newcomer to the subject may find it difficult to see the wood for the trees; the book would have been clearer if much of the historical and experimental detail and some of the interesting digressions had been omitted. However, despite its faults, the book is a useful addition to the literature of sulphur chemistry.

PETER SCHWARZ.

Data on Interatomic Distances

TABLES OF INTERATOMIC DISTANCES AND CONFIGURATION IN MOLECULES AND IONS; Scientific editor, *L. E. Sutton;* Chemical Society Special Publication No. 11; London 1958. £2 2s. U.S.A. $6.

This elaborate and comprehensive compilation is the result of a great deal of hard work and co-operation by specialists in the different fields which contribute data on interatomic distances. It receives its hallmark of authority from the distinguished name of its scientific editor and the names of those associated with him.

The tables include information obtained by spectroscopy (including nuclear magnetic resonance studies), by electron diffraction, by neutron diffraction, and by X-ray diffraction about:

(i) Interatomic distances and bond angles (a) in gaseous molecules and radicals, charged and uncharged; (b) in molecules occuring in the solid state; (c) in complex ions occuring in the solid.

(ii) Interatomic distances in crystals for pairs of simple ions which have been observed and reported as molecules or as ions-pairs in the vapour, e.g. NaCl.

(iii) Interatomic distances in adamantine lattices when these are of interest for comparison with distances found in simpler molecules, e.g. the C-C distances in diamond and graphite.

(iv) Interatomic distances in metals.

They thus form a complete survey of the determination, by all available means, of chemically significant interatomic distances. The literature published up to 31 December 1955 has been searched systematically.

General arrangement of the tables is extremely well contrived; any particular piece of information can be located quickly after a little practice; this is in no small measure due to a very adequate and logical system of cross-referencing.

The whole compilation is undoubtedly so important and the price so low as to make it a must in the library of every research worker. It should be added that the low price was made possible only because the work of the compilers was contributed without any form of payment, and publication was assisted by the Department of the United States Army through its European Research Office. A final welcome feature of the project is that it is planned to prepare from time to time supplements covering work published in the intervening period. The first supplement will cover work up to 31 December, 1959.

HENRY MACKLE.

Technical Translations from Russian

INFORMATION on how to obtain results of research and development in the U.S.S.R. and other Soviet-orbit countries is given in a leaflet issued by the Pergamon Institute, Headington Hill Hall, Oxford.

The Institute supplies translations and evaluations of Russian scientific publications, abstracts, patents, a digest of the world's technical press and translations of Russian journals and text books.

Chemist's Bookshelf

Practical Application of Gas Chromatography to Analysis

GASCHROMATOGRAPHIE. By *E. Bayer.* Springer Verlag, Berlin. 1959. Pp. viii + 163. DM. 39.60.

Development of gas chromatography has revolutionised the analysis of gases and volatile organic materials, and it is clear that this technique is of outstanding value not only in routine industrial analysis but also in preparative organic chemistry and in the study of gas kinetics. However, the number of monographs on the subject is still small and this is the first to be published in German. The volume is mainly devoted to gas-liquid chromatography although gas-solid chromatography is also considered. In the introduction, Dr. Bayer draws our attention to the fact that the former technique is by no means new; it can be traced back to 1512 when it was used preparatively in the concentration of alcohol.

The volume is mainly concerned with the practical application of gas chromatography to the qualitative and quantitative analysis of various groups of compounds, but more fundamental aspects are also considered. Thus the first chapter (5 pages) provides a brief mathematical discussion of the separation process, while the second chapter (13 pages) deals with the design and packing of columns. The carrier gas, the injection system, detectors, collectors and thermostats are considered in the third chapter (19 pages). The section on detectors is amplified in an appendix which provides an excellent, though brief, survey of the theoretical principles involved and of their experimental realisation.

The lengthy fourth chapter (57 pages) opens with a brief section on the general principles underlying the use of gas chromatography for qualitative and quantitative analysis. This is followed by a systematic account of the analysis of various classes of compounds beginning with a substantial section on the gas-solid and gas-liquid chromatography of hydrocarbons. Other systems discussed include acids, esters, amines, alcohols, aldehydes, ketones, essential oils, organic sulphur derivatives and inorganic compounds such as the boron hydrides and silanes. Analysis of coal gas and other industrial gases and of organic solvents is also considered. Full details are given on the preparation of column packings and on the conditions used in the various separations. The chapter is supplemented by an appendix which gives extensive tables of retention volumes and 'selectivity coefficients', the 'selectivity coefficient' being a quantity defined by the author to provide a numerical measure of the retention selectivity of a liquid phase with respect to various substances (see also Angewandte Chemie, 1959, **71**, 299). These tables and the preceding chapter are probably the most valuable part of the book, especially for those who already possess one of the English monographs.

The volume contains over 300 references which cover the literature up to May 1958. It is well produced and English readers will be grateful to Dr. Bayer for his easily digestible German style.

PETER SCHWARZ

Symposium Papers on Co-ordination Compounds

CHEMISTRY OF THE CO-ORDINATION COMPOUNDS. General editors, *H. Taube* and *A. G. Maddock.* Pergamon Press Ltd., London, 1958. Pp. 638. Price 100s.

The title of this book is identical with that of the recent A.C.S. publication by Bailar, but there is little resemblance between the two for the text of this book constitutes a collection of 78 papers read at a symposium on co-ordination compounds held in Rome in September 1957. The conference was sponsored by The Italian Chemical Society, I.U.P.A.C. and the National Research Council of Italy.

Each paper is published in the language in which it was read, viz. English, French, German or Italian. In the index the titles are translated into the other three languages, but unfortunately this procedure was not adopted for the lecture summaries. This is not as serious as might be from our point of view, however, since many of the Italian authors reported in English. A summary of the discussion appears at the end of each paper and there is an author index which covers papers and discussion.

The papers themselves are classified in five sections: I, the chemical bond, U/V., I/R., and Raman spectroscopy; II, stereochemistry, reactivity, stability constants; III, magnetic and structural properties; IV, valency stabilisation and unusual compounds; V, catalytically active complexes. The introductory lectures in the five sections were given respectively by L. E. Sutton (U.K.), J. C. Bailer (U.S.A.), R. S Nyholm (U.K.), J. Chatt (U.K.) and G. Natta (Italy). It would be invidious to make comparisons between various papers nor would it be appropriate to single out any for special mention. Suffice it merely to say that the papers presented give a truly representative cross-section of present-day research and interpretation in inorganic chemistry. In this respect, this volume is perhaps superior to many inorganic textbooks. It is a source of information which should be available to all interested in co-ordination compounds.

T. S. WEST.

INDIAN CHEMICAL INDUSTRY EXPANSION PLANS

PARTICULARS of companies which, according to information tabled in the Indian Parliament, had been granted licences under the Indian Industries (Development and Regulation) Act, 1951, for the establishment of new industrial undertakings, the expansion of an existing industrial undertaking and/or the manufacture of a new article were detailed in a special register circular (GEN. 3782/F, 7 May 1959).

The Indian Ministry of Commerce and Industry gave particulars of licences which had been granted during the period January to March 1959. The following are supplementary to those given in the previous special register circulars.

In the inorganic heavy chemicals industry Kanpur Chemical Works Private Ltd., Anwar Ganj, Post Box No. 27, Kanpur will at Kanpan, Kamptee P.O., Bombay, substantially expand sulphuric acid to 75 tons/month and ferric alumina to 150 tons/month.

Shambhu Nath and Sons Ltd., G. T. Road, P.B. No. 12, Amritsar, will expand production of nickel salts such as carbonate, sulphate, double salt (nickel ammonium sulphate) nitrate, chloride, etc. Monthly installed capacity will be 5,000 lb.; zinc chloride (90/99%) 10 tons/month; sodium aluminate 50 tons/month; sodium phosphate 10 tons/month.

Robtas Industries Ltd., Dalmianagar, Bihar, are increasing capacity to 60 tons of hydrochloric acid per month.

Expansion of chlorosulphonic acid manufacturing facilities to 90 tons/month is to be carried out by Dharamsi Moraji Co. Ltd., Fort Bombay, at Amberuath District, Thana, Bombay State.

Plastics and Resins

In the plastics and synthetic resin field, Machinery Paint and Chemicals (India) Ltd., Bombay, plan to substantially expand their alkyd resin manufacture to 60 tons a year at Mogra, Andheri, Bombay.

Production of insecticides, fungicides and herbicides is to be substantially expanded by several undertakings—Alembic Chemical Works Co. Ltd. at Baroda, and Baharat Pulverising Mills Private Ltd. at Byculla, Bombay, and at Sayani Road, Bombay. Alembic are increasing their solid formulations annually as follows: B.H.C. 10 tons, chlordane 7 tons, lindane 2 tons, endrin 5 tons, parathion 5 tons, copper fungicides 10 tons, and warfarin 5 tons. In their liquid formulations annual capacity will be increased to: B.H.C. 10 tons, chlordane 5 tons, lindane 3 tons, endrin 5 tons and parathion 7 tons.

At Byculla Bharat plan additional monthly production of 300 tons of formulations of B.H.C., D.D.T., lindane, aldrin, dieldrin, endrin, chlordane, malathion, parathion, copper oxychloride, 2-4 D, mercury salts and zinc phosphide and at Sayani Road, Bombay, 312 tons monthly of similar formulations.

In the textile auxiliaries industry, Sardesai Brothers (P) Ltd. are to expand production of sodium carboxymethyl cellulose to 100 tons/month and their resin finishes and stabilising catalysts a year to 900 tons at their Post Sardesai Factory, Bilimora; and Hindustan Lever Ltd., at Haji Bundar Sewri, Bombay, will increase synthetic detergent powder production to 300 tons a month.

Substantial expansions in miscellaneous chemicals have also been licensed. Calcutta Industrial Chemicals and Minerals Co. Private Ltd., will produce calcium stearate 3 tons/month, magnesium stearate, 2 tons/month, and lead stearate, 2 tons/month, in Calcutta 15. Acetylene production is to be expanded to 360,000 cu. ft./month by Modi Vanaspate Manufacturing Co., Modinagar District, Meerut, Utah Pradest. This company will also increase oxygen production to 1,779,120 cu. ft./month and fatty acids (stearic, oleic acid, etc.) to 75 tons/month.

Gas Chromatography for Beer

FOR measuring volatile components of beer during brewing, fermentation and storage, a gas chromatography technique has been developed by Paul Lewis Laboratories, Milwaukee, Wisconsin, U.S. It is claimed that the method is good enough for breweries to use as a quality control tool. It is also believed that it may be the first development in offering an objective approach to flavour control.

Used in a brewery, the gas chromatograph detects beer's continuously changing volatiles content, enables corrective measures to be taken during any stage in the beer-making cycle and can also measure the stability of volatiles during beer storage or after bottling.

In the technique developed by Paul-Lewis, sampling and analyses are carried out during practically every beer processing step and in storage cellars. For fermented or finished beer, drilling and decarbonation are effected and then distillation is used to concentrate volatiles to a measurable level. The sample is then chromatographed.

Chromatographic spectra of most samples show two peaks, both of which represent volatile browning reaction components. The small peak is acetone, and the larger peak, still unidentified, probably a mixture of several classes of compounds. Investigations are now being carried out to identify these compounds and other volatiles.

Height of the browning peak is found to vary from batch to batch and even during the different stages of work processing. When wort is boiled near the end of the operation, the peak is found to rise rapidly, due, it is believed, from liberation of aldehydes and other volatiles during melanoidin and caramelisation.

During fermentation isoamyl alcohol has been identified during the first day as against detection at the fifth day with other techniques. On the second day, ethyl acetate and D-amyl alcohol are detected with an increase in iso-amyl alcohol. On the third day amyl acetate appears and by the fifth day all components are at their maximum. Ethyl alcohol obscures the browning reaction peak throughout fermentation and the acetone peak is hidden by an unidentified transient peak in the early stages of fermentation, Paul-Lewis report.

Of 29 beers examined, no two are exactly alike. Ethyl acetate has ranged from 14.5 to 27.4 p.p.m.; while total amyl alcohol has ranged from 57 to 94 p.p.m. However, for a given set of brewery fermentation conditions, each volatile appears at a definite time and increases to a maximum at a characteristic rate. Increases continue into storage with the higher alcohols reaching their limit after about two weeks. Bottled beer, after several months still shows lower levels of esters and amyl alcohols. Acetone remains the same.

DIARY DATES

MONDAY 5 OCTOBER

S.C.I.—London: Royal Inst., Albemarle St., W.1. 6.30 p.m. 'The polymerisation of olefines using organo-metallic catalysts', by Sir Robert Robinson.

Plastics Inst.—Leicester: Grand Hotel, 6.45 p.m. 'Plastics in the cosmetics and pharmaceutical industries', by Mr. K. Eley.

TUESDAY 6 OCTOBER

Bradford Chem. Soc.—Bradford: Inst. of Technology, 7 p.m. 'Protein chemistry', by Dr. R. S. Asquith.

Inst. Chem. Engineers—London: Geological Soc., Burlington House, S.W.1, 5.30 p.m. 'Controlled crystallisation of sodium chloride', by Dr. J. Bain and Dr. F. Rumford.

Inst. Metal Finishing—Birmingham: Imperial Hotel, Temple St., 2 p.m. Symposium at International Conference on Electrodeposition and Metal Finishing.

Plastics Inst.—London: Wellcome Building, 183 Euston Rd., N.W.1, 6.30 p.m. 'Design in plastics', by Mr. M. O. Rowlands; 'Terylene', by Mr. I. E. Haden.

WEDNESDAY 7 OCTOBER

Inst. of Welding—Manchester: Coll. Science and Tech., 7.15 p.m. 'The importance of welding research for industry', by Dr. R. Weck.

S.A.C.—London: Chemical Soc., Burlington House, W.1, 7 p.m. 'Atmospheric pollution analysis', by Dr. J. C. Cage, Mr. R. J. Powell, Mr. P. J. Phennah, Mr. R. C. Chirnside and Mr. B. T. Commins.

S.C.I., with Plastics Inst.—Newport, Mon.: King's Head, 7 p.m. 'Hydrocarbon polymers', by Prof. C. E. H. Bawn. Preceded by visit to British Nylon Spinners, Pontypool.

THURSDAY 8 OCTOBER

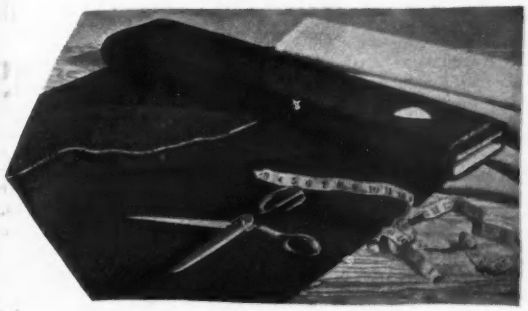
S.C.I.—Liverpool: Donnan Labs., University, 8.30 p.m. 'Chemical derivatives of fats for industrial utilisation', by Dr. Waldo C. Ault.

FRIDAY 9 OCTOBER

O.C.C.A.—Manchester: Textile Inst., 10 Blackfriars St., 6.30 p.m. 'Pigment vehicle relationships', by Dr. F. M. Smith.

Plastics Inst.—London: President's reception and conversazione, House of Commons. Tour of Houses of Parliament from 6.30 p.m.

S.A.C.—London: The Feathers, Tudor St., E.C.4, 6.30 p.m. 'Routine toxicity tests in the control of pharmaceuticals', discussion opened by Mr. P. Andrews.



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PEOPLE in the news

● **Lieutenant-General Sir Ian Jacob** has accepted an invitation to join the board of Fisons from 4 January. Sir Ian has been director-general of the B.B.C. since December 1952, and will be retiring at the end of the year.

● **Mr. W. J. Jenkins,** who was chairman of the Nobel Division of I.C.I. until his retirement in 1955, is one of the 12 members of a mission which the World Bank is sending to Venezuela, at the request of the government, to make a general survey of the economy and to assist in the formulation of a programme of economic development.

● **Dr. H. J. Marrinan** who has been at British Rayon Research Association for seven years, left on 24 September to go to the U.S. for one year. He was engaged at British Rayon Research on fundamental research on celluloses and has gone to Syracuse University, New York State, where he will be engaged on similar work.

● **Mr. R. J. A. Haskew,** elder son of the founder of the General Chemical and Pharmaceutical Co. Ltd., has been appointed chairman and managing director of the company. Mr. Haskew, who read international banking and finance for an honours degree before becoming a Chartered Secretary, was elected to the board of the company in 1951.

● **Mr. Charles Soukup,** managing director of Richard Klinger Ltd., manufacturers of Klingerit high-pressure jointing, sleeve-packed cocks and Klingerflow valves, has retired owing to ill health. Mr. Soukup has been associated with the company for nearly 50 years, and on reaching his 65th birthday in October 1956 was presented with a portrait in oils by the management and staff, painted by A. Egerton-Cooper, R.B.A. His retirement coincides with the birth of a new venture in Australia where he has planned a unit, now nearing completion, for the manufacture of Klingerit high-pressure jointing.

● **Mr. A. H. Thomas,** British Belting and Asbestos Ltd., Cleckheaton, Yorks, has been elected president of the Purchasing Officers' Association. He joined his present company in London in 1922, transferring to Cleckheaton in 1939. He is a member of the Manchester Exchange.

● **Mr. E. F. Choppen** has been appointed a director of Esso Petroleum Co. He joined the company as a chemist in 1930 and became manager of the co-ordination and economics department in 1957, a position he has now relinquished.

● **Dr. David Traill,** research director, Nobel Division, Imperial Chemical Industries, who retires this month, was presented with gifts from his colleagues in the division's research department and Ardeer factory, Stevenston, on 25 September. Dr. Traill has been research director since 1951. He joined the department at Ardeer in 1926, after graduating from St. Andrew's University with a first-class honours degree in science and two years of post-graduate study at Durham University.

● **Mr. P. G. E. Warburton** is to resign as managing director of William R. Warner and Co., Lambert Chemical Co. and Richard Hudnut, subsidiaries of Warner-Lambert Inc. of New Jersey, U.S., on 12 October, but will continue as chairman. He will be succeeded as managing director by **Mr. W. J. Lloyd. Mr. K. J. Golds** is retiring from the boards of the three subsidiaries, from that date, and will be succeeded as director of administration and secretary by **Mr. R. F. Caldersmith.**

● **Dr. Rudolf Schmidt,** a director of the West German chemical concern Schering AG. and vice-president of the German Society of Chemical Industry, will from 1 January succeed **Professor Haberland** as president of the German Association of Chemical Manufacturers.

● **Mr. C. B. Branch and Mr. Donald K. Ballman** have been elected vice-presidents of the Dow Chemical Co., of Michigan.

● **Mr. P. Allan Charlesworth,** a director of Electropol Processing Ltd., and managing director of the patent holding company for the process, Electropol Ltd., Poynton, Cheshire, is now on a tour of the U.S. Mr. Charlesworth is the inventor of the Electropol process for polishing stainless steel by electrolytic action. He will be visiting the Republic Steel Corp. of Cleveland, the Battelle Development Corp. of Columbus, the Eastman Kodak Co. of Rochester, N.Y., and other companies.

● **Mr. Michael Boby,** managing director of William Boby and Company Ltd., water treatment engineers, Rickmansworth, Herts, is making a rapid world sales research trip, some 28,000 miles by air in a few days with stopovers for business talks. He is going primarily to visit West Coast American research-backers to establish patent rights and research facilities for electrodialysis and to take British technical knowledge on this and allied water treatment problems to Australasia.

'Instruments of Destiny' Conference Theme

'INSTRUMENTS of Destiny' is the theme of the 3th convention of the Scientific Instrument Manufacturers' Association of Great Britain, to be held at Brighton from 22 to 24 October.

During the first five months of 1959, there was a 7% increase in manufacturers' deliveries for export of certain scientific and industrial instruments; compared with the same period in the previous year, the Board of Trade reports. An index of the output of the industry shows that in the first five months, production was 5% greater than in the corresponding 1958 period. The index published for the first time, shows that between 1956 and 1958 production by the industry rose by 9%.

This increase coincides with the increased promotion efforts of many firms and associations through the British Instruments Directory.

Growing impact is reflected in the activity of the British Instrument Inquiry Service (IMPERIAL 6000) supported jointly by SIMA, BSIRA and DSIR, which is now handling enquiries at a rate of more than 3,000 a year.

British scientific and industrial instrument exports to the U.S. were recently reported to be £6 m. for the year 1958 and £4 m. for the first seven months of 1959.

S.C.I. Surface Activity Group Officials

THE Surface Activity Group of the Society of Chemical Industry at the first annual general meeting made the following appointments: Chairman, Sir Eric Rideal, M.B.E., F.R.I.C., F.R.S.; hon. treasurer: R. C. Tarring, B.Sc., A.R.C.S., D.I.C. (Shell Chemical Co. Ltd.); hon. recorder: F. Riley (Marchon Products Ltd.); hon. sec.: M. K. Schwitzer, M.I.Chem.E., Armour Hess Chemicals Ltd., 4 Chiswell Street, London E.C.1 (tel: METropolitan 0031).

Committee: K. Burrow, J. B. M. Coppock, R. L. Demuth, M. G. Fleming, A. F. Kertess, J. L. Moilliet, A. C. Monkhouse, K. G. A. Pankhurst, Conmar Robinson, L. N. Savidge, R. C. M. Smith, H. K. Whalley.

Membership of the Surface Activity Group is open to all members of the Society of Chemical Industry.

British Oxygen Gases Strike

About 1,100 men employed by British Oxygen Gases Ltd. have come out on unofficial strike at 11 of the company's gas-producing works, mainly in the London and Birmingham areas. The company has 52 gas-producing works. The strike is over a claim for an increase in wages

B.O.G. state that the matter is in the hands of the unions.

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Commercial News

- **I.C.I. Net Income up Nearly 50%**
- **Power-Gas Subsidiaries to Control Trading**
- **Three Chemical Firms Increase Capital**
- **Dow Chemical Sales Reach Record**

I.C.I.

Imperial Chemicals Industries Ltd. have raised their interim dividend from 6.4 pence a £1 unit (2⅔%) to 9d (3¾%).

Group sales to external customers for the first half of 1959 are up compared with the corresponding period of 1958 from £232 million to £250 million. This increase, the board state, reflects the net effect of an appreciable increase in the volume of sales and a reduction in selling prices over a wide range of products. The increase in volume of group sales was due mainly to the higher level of industrial activity in the U.K. and a substantial increase in exports.

Group income before tax has risen from £24.4 million to £34.8 million and after tax is £20.2 million against £13.6 million. Tax provision was up from £10.8 million to £14.6 million.

After deducting income applicable to minority interests group net income applicable to I.C.I. is almost £19 million, compared with £12.4 million.

The amount charged for depreciation in arriving at group income before taxation was up from £14.3 million to £15.6 million.

The board state that the increase in profits is attributable to lower unit costs of production arising from fuller use of manufacturing capacity and continuing improvements in technical efficiency. Sales volume and net profits were more satisfactory in relation to capital invested than the disappointing results for 1958.

Berry Wiggins

Berry Wiggins and Co. announce a rights issue of 397,500 5s ordinary shares at 12s 6d each in the proportion of 19 for every 100 held on 11 September.

Profit for 1959 is expected to exceed last year's and the board expects at least to maintain the dividend on the increased capital. Last year 15% was paid.

Visco Engineering

Whole of the share capital of Visco Engineering Co., Croydon has been acquired by Serck Ltd. The purchase consideration is the issue to Visco shareholders of 55,570 new Serck 5s ordinary shares, together with a cash payment of £222,804 financed out of the company's current resources.

Visco manufacture air filter, ventilating and air conditioning plant, water and oil coolers, etc., and their products are complementary to some of those already manufactured in the Serck group.

Dow Chemical

The Dow Chemical Co.'s major manufacturing divisions are operating at an average level of more than 70% of capacity, and the company may enjoy another sales increase of 10 or 15% in the present fiscal year, stockholders were told at the annual meeting in Midland, Mich., U.S., on 16 September. Foreign operations account for about 10% of Dow's total sales and are "expanding vigorously".

Foreign plants operated at a higher percentage of capacity during the year than similar domestic plants. West Europe is the major outlet for exports, followed by the Far East and Central and South America.

Dow sales reached a new record of $705 million in the year ended 31 May ($636 million). Earnings totalling $63 million were 37% higher than the $46 million earned in 1958.

Throughout most of its product areas, the company has been getting closer to the consumer. For example, Dow are test marketing their own brand of glycol antifreeze; they also have an experimental programme in the sale of small-package agricultural chemicals for home and garden use.

Dow recently introduced Zerlon, a copolymer of styrene and methyl methacrylate. Good clarity and weatherability make Zerlon suitable for outdoor use in applications such as signs and automobile tail light lenses.

Power-Gas

As from 1 October, Power-Gas Corporation have transferred their trading activities to two wholly-owned subsidiaries. Ashmore Benson Pease and Co. will control the Stockton works specialising in the design, manufacture and supply of plant and equipment for the iron and steel industry. P.G. Engineering will undertake the design, supply and erection of plant and equipment for the chemical, petroleum, petrochemical, gas, nuclear energy and other industries.

Mr. W. R. Brown is chairman of both subsidiaries.

Albright and Wilson

Albright and Wilson Ltd. are increasing their capital from £9 million to £12 million. They are making a one-for-four issue to ordinary shareholders.

Reichhold Chemicals

Reichhold Chemicals Ltd. have declared an interim dividend of 7½% for the year 1959. This is an effective increase from 5⅝%, allowing for a one-for-three free share issue made before last year's final of 12½%.

INCREASE OF CAPITAL

MAY AND BAKER LTD. Increased by £1 million over registered capital of £5,037,500.

SMITH, KLINE AND FRENCH LABORATORIES LTD. Increased by £500,000 beyond registered capital of £500,000.

GREENWOOD LABORATORIES LTD. Increased by £90,000 over registered capital of £10,000.

Market Reports

STEADY DEMAND FOR SODA AND POTASH

LONDON In the market for industrial chemicals there has been a steady demand for the routine soda products and potash chemicals, while in other directions sulphate of copper and hydrogen peroxide have been fairly active on home and export account. Contract delivery specifications have covered good volumes and rather more interest has been shown in new forward business.

A reduction in zinc oxide prices has been notified, the red seal now being quoted at £99 per ton as from 28 September.

Most of the coal-tar products are moving steadily with available supplies finding a ready outlet.

MANCHESTER Current reports on the Manchester market for heavy chemical products point to a steady movement of supplies of the soda and potash compounds and of a wide range of miscellaneous chemicals to home consumers. Replacement buying is said to be on a reasonably good scale. Shipping business in most lines is also maintained at a satisfactory level. There has been little change of any consequence in the general price position compared with last report.

In the market for fertiliser materials there has been a fair call for the compounds, with a continued study demand for the higher grades of basic slag.

SCOTLAND The past week opened on a slightly quieter note, but business improved and overall the trading position was reasonably active. Quantities demanded showed little alteration and covered as usual quite a varied range. Contract requirements were also well maintained. Prices showed little variation and mostly remained firm. Conditions in the export market are still showing interest both in regard to enquiries and orders received.

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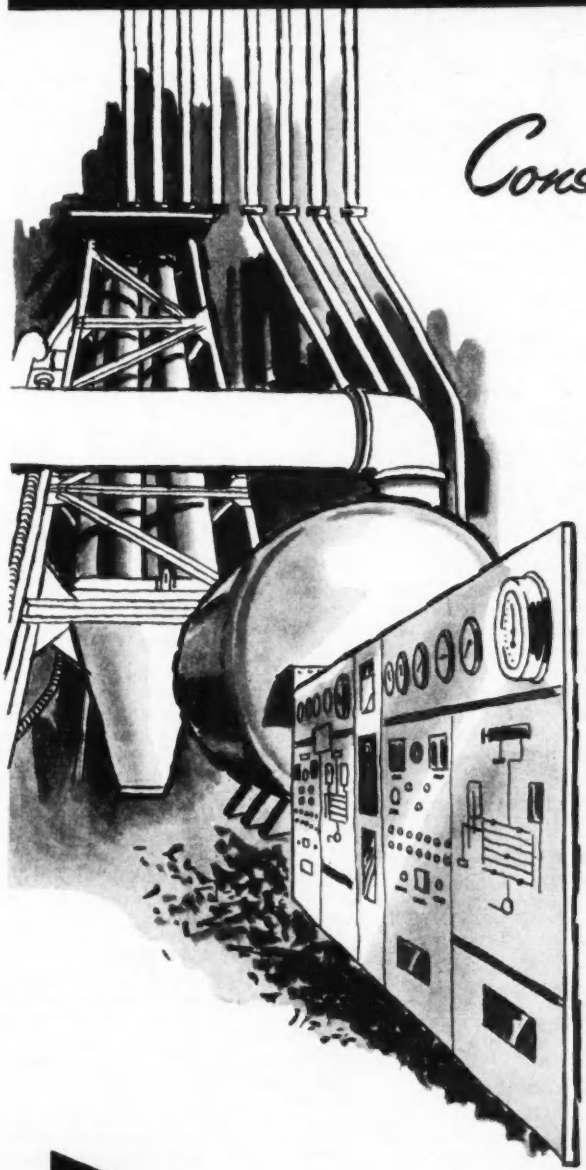

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TRADE NOTES

Catalyst Exempt From Duty

Dabco, the catalyst for one-shot urethane foams imported by Jacobson Van Den Berg and Co. (U.K.) Ltd., has been exempted from import duty until 30 September 1960. The duty was 33⅓%.

Course on Chemical Process Plant

A course on 'Design and Selection of Chemical Process Plant' will be held at Bradford Institute of Technology on Thursday evenings, from 29 October to 10 December. The fee is £2. Further details may be obtained from the Registrar, Bradford Institute of Technology, Bradford, Yorks.

Instrument Manufacturers' 25th Anniversary

Foxboro-Yoxall Ltd., manufacturers of industrial control instruments, celebrated their 25th anniversary with an open day and a sports day at Redhill, Surrey.

Glycerine Price Down

From 28 September all despatches of refined glycerine by Glycerine Ltd., in tank wagons in lots of 10 tons or more have been reduced in price by £1 10s a ton.

Export Products List

A newly published chemical "Export Products List" of Hooker Chemical Corp., Niagara Falls, N.Y., is available free. This bulletin, No. 11, contains brief descriptions, physical data, uses and packaging information on about 31 chemicals.

The export sales offices of the company are at 60 East 42nd Street, New York City. Products for export range from benzoic acid to zinc phosphide.

High Impact P.V.C. Cements

A complete range of cements designed for bonding high impact p.v.c. piping is being made by Progressive Finishes Ltd., Stockley Street, Northampton.

The cements are all based on Geon p.v.c. and the range consists of seven grades, each formulated according to particular requirements. The cements are supplied in four-ounce, quart, gallon and five-gallon containers.

Voss Showing on Continent

A range of Voss laboratory and industrial stirrers will be on show at the forthcoming Scientific Instrument Exhibition "Het Instrument" in Utrecht, Holland, at the beginning of October and at a similar exhibition in Brussels "Laborama" from 23-29 October.

Adhesives for Wood

Forest Products Research of the Department of Scientific and Industrial Research have issued Bulletin No. 38, 2nd edition of 'The Efficiency of Adhesives for Wood'. The report is obtainable from H.M.S.O., price 3s net, and summarises the progress reports issued up to January 1959. Accounts are given of five series of tests on adhesives for plywood manufacture and of eight with glues for assembly work. Data from experiments of five years' or longer duration are included indicating which types of glue will behave efficiently in various defined environments.

Glass Containers

A wide range of bottles for the pharmaceutical industry as well as reagent and other bottles are described in a catalogue of glass containers issued by Glastics Ltd., Barnet Trading Estate, Park Road, High Barnet, Herts.

Another publication describes their ceramic labelling, a process in which the 'label' is screen-printed on to the glass and then fired on.

E.C.G.D. Cover for Yugoslav Business

The Export Credits Guarantee Department is now prepared in appropriate cases to insure capital goods business with Yugoslavia on terms of credit extending to five years from date of shipment. Hitherto for this market the limit has been three years from shipment.

Strip and Sheet Copper

I.C.I. Metals Division have issued their first comprehensive publication covering their main copper and brass sheet and strip production. The booklet ('I.C.I. Sheet and Strip—Copper and Copper Alloys') describes the operation of the Kynoch Works, Witton, Birmingham, and the qualities of the metals.

New Electronics Firm

Mr. D. C. Adams, until recently sales manager Hivolt Ltd., and Mr. R. C. Lever, chief engineer of that firm, have formed their own company—Hursant Electronics Limited, 13-14 The Mall, Ealing, W.5. It specialises in the application of electronics in industry and education. Combined facilities for both mechanical and electronic design and manufacture enable it to undertake complete projects.

New Ball Assembly

The latest sales leaflet to be issued by J. Collis and Sons Ltd., Regent Square, London W.C.1, describes a new heavy-duty model 2-in. ball assembly, with a capacity of 750 lb. There is also a 1-ton model with a 3-in. ball.

Dixylon Belting

A new catalogue for Dixylon plastic transmission belting, which is claimed to be stretchless, silent and smooth running, has been published by R. and J. Dick Ltd., Greenhead Works, Glasgow S.E. The catalogue gives information on belt thicknesses, coefficients of friction, horsepower rating per width of belt, etc. Performance is not affected by humidity, dryness or dust provided these factors are taken into account when calculating the initial belt tension. Antistatic belting is available for use in the presence of inflammable vapours and explosive dusts.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 11 November

Separation of mixtures of liquids. Cassella Farbwerke Mainkur AG. **823 297**
Dyeing process. Whiffen & Sons Ltd. **823 446**
Fluid fertilisers. Scottish Agricultural Industries Ltd. **823 449**
Olefin polymerisation. Union Carbide Corp. **823 306**
Polymerisation of ethylenically unsaturated compounds. Du Pont de Nemours & Co., E. I. **823 307**
Process for making fibres and filaments of poly (4-methyl-1-pentene). Union Carbide Corp. **823 309**
Process for the reduction of esters with sodium—and potassium boron hydride. Farbenfabriken Bayer AG. **823 318**
Reforming of petroleum naphthas. Esso Research & Engineering Co. **823 320**
Preparation of graft copolymers. Union Carbide Corp. **823 462**
2-Chlorophenothiazine derivatives. Upjohn Co. **823 470**
Arrangement for drawing off the charging gases from a coking chamber oven. Koppers GmbH., H. **823 489**
Production of polyethylene polymers. California Research Corp. **823 344**
Polymers, process for producing the polymers and shaped structures containing these polymers. Du Pont de Nemours & Co., E. I. **823 345**
Stabilisation of cracked naphtha. Esso Research & Engineering Co. **823 349**
Production of thiodiglycol polycondensation products. Farbenfabriken Bayer AG. **823 352**
Catalysts. British Oxygen Co. Ltd. **823 354**
Iodo-carboxymethyl dextran and methods of making it. Commonwealth Engineering Co. of Ohio. **823 360**
Preparation of mixtures of amino acids. Wretlind, K. A. J. **823 322**
Silica-alumina hydrocarbon reforming catalyst. Atlantic Refining Co. **823 324**
Method and means for separating heavy particles from sands. Miller, T. W. **823 480**
Continuous process for producing alkyl aromatic hydroperoxides. California Research Corp. **823 325**
Producing sodium borohydride or mono- or di-organo-borines. Kali-Chemie AG. **823 327**
Production of sulphur-containing ethylene imine derivatives. Badische Anilin- & Soda-Fabrik AG. **823 482**
Fungicide. Allied Chemical Corp. **823 329**
Bridgehead nitrogen compounds and a process for manufacture thereof. Grace & Co., W. R. **823 332**
Preparing hydrides and organically substituted hydrides of silicon, germanium, tin and phosphorus. Kali-Chemie AG. **823 483**
Water-base rust preventative and lubricant. Esso Research & Engineering Co. **823 484**
Fluorination of organic compounds with sulphur tetrafluoride. Du Pont de Nemours & Co., E. I. **823 336**
Preparation of alkylamine sulphate solutions. Soc. D'Etudes Chimiques pour L'Industrie et L'Agriculture. **823 337**
Diquaternary salts of aminoalkyl piperidine. Thomae, GmbH., K. **823 338**
Distillation of ethanol. Chematur AB. **823 339**
Recovery of copper. Du Pont de Nemours & Co., E. I. **823 487**
Production of terephthalic acid. Soc. Rhodiaceta. **823 488**
Immunologic preparations. National Drug Co. **823 489**
Iron ore reduction process. Inland Steel Co. **823 493**
Removal of water from steam-stripped liquid hydrocarbon oil distillates. Bataafsche Petroleum Maatschappij NV., DE. **823 495**
Preparing high purity silicon. Metal Hydrides Inc. **823 496**
Phosphate esters suitable for use as pest control agents. Boehringer, A., Boehringer, E., Liebrecht, I., Liebrecht, J., and Mayer-List, W. [trading as Boehringer Sohn C. H.]. **823 505**
Purification of tetrachlorophthalic acid and its anhydride. Chemische Werke Witten GmbH., formerly Imhausen Werke GmbH. **823 507**
Polymerisation of vinyl chloride. Solvic SA. **823 511**
Dehydrogenation of alcohols. Engelhard Industries Inc. **823 514**
Production of terephthalic acid esters. Chemische Werke Witten GmbH. **823 515**
Purification of kanamycin. Bristol Laboratories International SA. **823 516**
5-Phenyl-5-tertiary-butyl-hydantoin. Reidel-De Haën AG. **823 517**
Preparation of fluorinated olefins. Dow Corning Corp. **823 519**
Cyanomethylene indoline derivatives. Farbenfabriken Bayer AG. **823 520**
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